140-44

creative computing®

July 1982
vol 8, no 7
$2.95

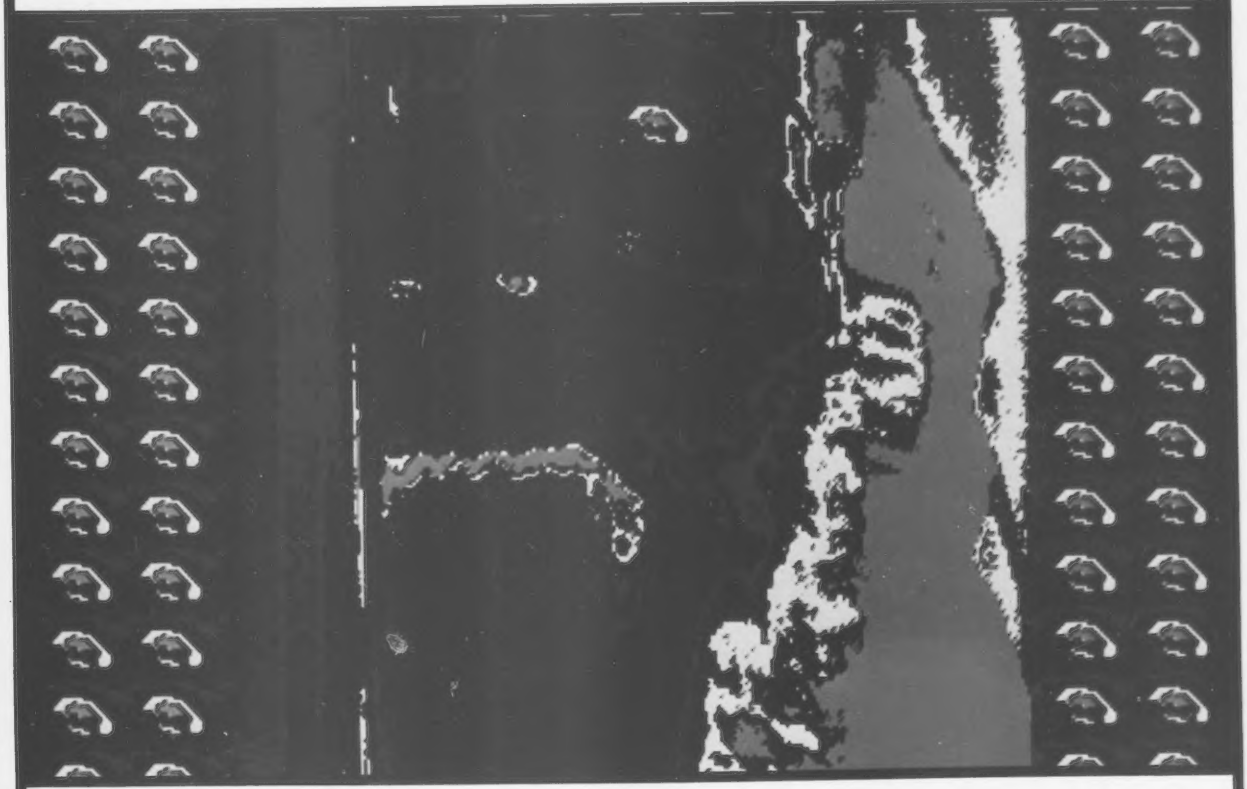
Focus on Computer Graphics

the #1 magazine of computer applications and software

In-depth Evaluations:
- Zoom Grafix
- GraForth
- Quest Super Color Board
- Talking Games
- Snake Byte
- Apple Pilot
- Special Effects
- 4 Hi-Res Text Generators

The Case Against Pilot

Computer Graphics Features:
- Plotting N-Space Cubes
- Half-toning Digital Images
- Graphics Subroutines for Apple
- Screen Saver
- Cyrillic Editor
- Turtlegraphics Interpreter
- Printing Lo-Res Graphics
- Mona Lisa Meets VersaWriter



0 14024 14044 07

Columns:
- IBM
- TRS-80
- Atari
- PET
- Letters
- New Products
- Legal Forum
- Book Reviews

Computing in Britain

Logo Ideas

Verse Weaving

ACTICAL PERIPHERALS, INC.
MICROBUFFER II
OPEN
1 2 3 4 5 6
B152
MM2716Q-1
B152
MM2716Q-1
MCM6685AL20
MCM6685AL20
MCM6685AL20
MCM6685AL20
C3
C7
C9
C13
J1
Serial
Number

INTRODUCING MICROBUFFER.

NOW YOU CAN USE YOUR PRINTER WITHOUT WASTING COMPUTER TIME.

Your computer is capable of sending data at thousands of characters per second. But the average printer goes no faster than 80 characters per second.

This means your computer is forced to wait for the printer to finish one line before it can send the next.

A waste of valuable time.

THE NEW MICROBUFFER™ INCREASES YOUR EFFICIENCY.

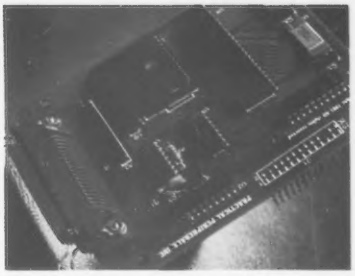
Microbuffer allows you to print and process simultaneously. No waiting!

MICROBUFFER ACCEPTS PRINTING DATA AS FAST AS YOUR COMPUTER CAN SEND IT.

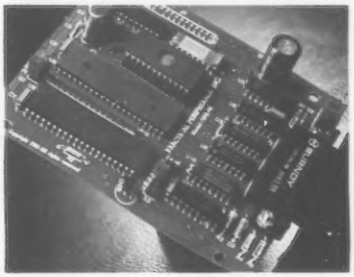
Microbuffer first stores the data in its own memory buffer and then takes control of your printer. This frees the computer for more productive functions.

Additional output may be dumped to the buffer at any time and it will be printed in turn.

Microbuffer — a must for any program that requires printed output.



MICROBUFFER MODEL MBP-16K™ is a Centronics-compatible parallel interface for your Epson printer with 16,384 bytes of on-board RAM for data buffering.



MODEL MBS-8K™ is a full-featured RS-232C serial interface for your Epson printer with both hardware and software (x-on/x-off) handshaking, baud rates from 300 to 19,200 and a 8,192-byte RAM buffer.

MICROBUFFER II™ (pictured on the left-hand page) is a Centronics-compatible parallel interface for the Apple II computer with up to 32K of on-board RAM for data buffering as well as on-board firmware for text formatting and advanced graphics dump routines.

SIMPLE TO INSTALL.

Microbuffer MBP-16K and MBS-8K mount easily in the existing auxiliary slot directly inside the Epson printer.

Microbuffer II, being slot-independent, will fit into any slot directly inside the Apple except zero.

MICROBUFFER FROM PRACTICAL PERIPHERALS.

When you think of how much time Microbuffer will save, can you afford *not* to have one?

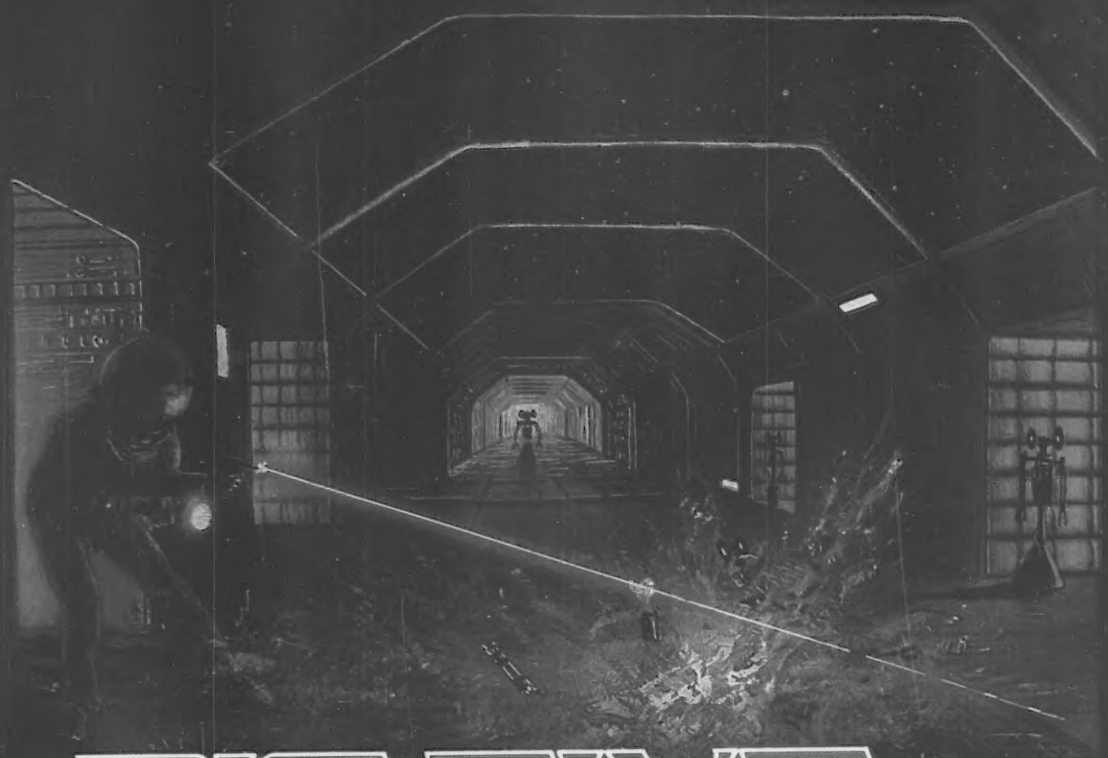
PRACTICAL PERIPHERALS, INC.
31245 LA BAYA DRIVE
WESTLAKE VILLAGE, CA 91362
(213) 991-8200

CIRCLE 216 ON READER SERVICE CARD

The Newest & Most Astounding Arcade Game that TALKS has Just Reached Planet Earth:

ROBOT ATTACK

BEST SELLER



BIG FIVE SOFTWARE

P.O. Box 9078-185 Van Nuys, CA 91409 (213) 782-6861

Ordering info for all games:

Super Nova, Galaxy Invasion, Attack Force, Cosmic Fighter, Meteor Mission 2, and Robot Attack:

Please add $1.50 each order for postage & handling. CA residents add 6% sales tax.
Outside USA - except Canada, please add $3.00 per order for postage & handling.
We accept checks, money orders, and MC/VISA orders. $2.00 extra for COD.

All games 16K Level 2 Model III/4. Require joystick. Programs are written in machine language for high quality graphics & sound effects. Voice & other routines are loaded from the cassette. Auto dump. High scores are automatically saved after each game on the disk system. TRS-80 is a trademark of Tandy Corp.
Write for complete descriptions and pictures of our products.
Dealers: All games now available at selected dealers nationwide. Call or write for the dealer nearest you.

CIRCLE 164 ON READER SERVICE CARD

in this issue...

evaluations & profiles

12 **The Quest Super Color Board**.....*Repsher*
Color graphics for S-100 computers

27 **Snake Byte**.....*Lubar*
Beware the perilous plums

28 **Talking Games for the TRS-80**.....*Linzmayer*
Robot Attack and Forbidden Planet

35 **Zoom Grafix**.....*Archibald*
Blowing up the screen

37 **Special Effects**.....*Flynn*
Awaken the artist in your Apple

43 **Four Hi-Res Text Generators**.....*Berentes*
A comparison

59 **GraForth**.....*Coffey*
A graphics language that's downright Forthright

62 **Apple Pilot**.....*Smith*

articles

70 **The Case Against Pilot**.....*Merrill*
The pros and cons of authoring systems

78 **Logo Ideas**.....*Lawler*
Bugs and variables

80 **Cover Story**.....*Wright*

83 **Loopholes**.....*Payack*

88 **An Art Medium in Lights**.....*Miller*
Mona Lisa meets Versawriter

92 **The Graph Paper**.....*Lubar*
Part one: introduction and explanation

97 **Art and the Computer**.....*Friedman*
A computer graphics course

the cover

The cover is a computer graphic design by Walter Wright. See the Cover Story on page 80 for more information on his technique.

applications & software

100 **Half-toning Digital Images**.....*Browning*
A tutorial

110 **A Graphics Package for the Apple**.....*Hansen*
A collection of graphics subroutines

120 **Cyrillic Anyone?**.....*Mangasarian*
Character editor for the Apple

136 **Printing Low-Res Graphics**.....*Navarro*

140 **Hturtle**.....*Evans*
A turtlegraphics interpreter in Applesoft

148 **Plotting N-Space Cubes**.....*Clark*
Making order out of chaos

162 **Screen Saver**.....*Gamble*

166 **Verse Weaving**.....*Denison*
A challenge for all ages

departments

6 **Input/Output**.....*Readers*

11 **Notices**.....*Fee*

185 **The Other Side**.....*Kewney*
A look at computing in Britain

188 **Outpost: Atari**.....*Small & Small*
Languages for the Atari

196 **IBM Images**.....*Fastie*
New products, software submission and more

208 **Personal Electronic Transactions**.....*Yob*
PET disks

216 **TRS-80 Strings**.....*Gray*
TRS-80 repairs, reviews and screensaver

224 **Software Legal Forum**.....*Novick*
Politics and patents

228 **New Products**.....*Staples*

232 **Book Reviews**.....*Gray*

MEMBER MITA

July, 1982
Volume 8, Number 7

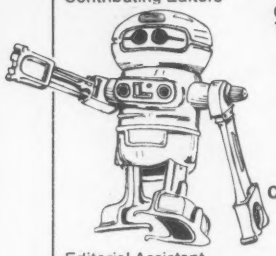
Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class postage paid at Lincoln, NE 68501.

Copyright©1982 by Ahl Computing, Inc. All rights reserved.

Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.
Domestic Subscriptions: 12 issues $24.97; 24 issues $43.97; 36 issues $57.97. Send subscription orders or change of address (P.O. Form 3579) to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.
Creative Computing is printed by Mid-America Webpress, Lincoln, NE 68501.
BPA (Selected Market Audit Division) membership applied for November 1981.

staff

Publisher/Editor-in-Chief	**David H. Ahl**
Editor	**Elizabeth Staples**
Managing Editor	**Peter Fee**
Technical Editor	**Michael Coffey**
Associate Editor	**John Anderson**
Contributing Editors	**Dale Archibald** **Charles Carpenter** **Thomas W. Dwyer** **Will Fastie** **Stephen B. Gray** **Glenn Hart** **Stephen Kimmel** **Ted Nelson** **Harold Novick** **Peter Payack** **David Small** **Alvin Toffler** **C. Barry Townsend** **Gregory Yob** **Karl Zinn**
Editorial Assistant	**Andrew Brill**
Secretary	**Elizabeth Magin**
Production Coordinator	**Christina L. Erickson**
Assistant Art Director	**Chris DeMilia**
Artists	**Diana Negri** **Candace Figueroa** **Carol Ann Henderson** **Eugene Bicknell**
Typesetters	**Karen Brown** **Renea Cole**
Advertising Director	**Irving Rodenberg**
Advertising Accounts	**Jennifer H. Shaler**
Creative Computing Press	**Laura Conboy**
Software Development	**Kerry Shetline** **Eric Wolcott** **Owen Linzmayer** **Neil Radick**
Software Production	**Bill Rogalsky** **Nick Ninni** **Mary Ellen Mendl** **Mark Levitt**
Operations Manager	**William L. Baumann**
Personnel & Finance	**Patricia Kennelly**
Bookkeeping	**Ethel Fisher**
Retail Marketing	**Jennifer Burr** **Laura Gibbons**
Circulation	**Frances Miskovich** **Moira Fenton** **Carol Vita** **Elsie Graff** **Pat Champion**
Office Assistants	**Rosemary Bender** **Linda McCatharn** **Diane Feller** **Mary McNeice** **Barbara Werry**
Order Processing	**Jim Zecchin** **Gail Harris** **Linda Blank** **Susan DeMark** **Joanne Sapio** **Bridget Maher**
Shipping & Receiving	**Ronald Antonaccio** **Mark Archambault** **Bill Thomas** **Scott McLeod** **Mike Gribbon**



advertising sales

Advertising Coordinator
Ann Magee
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3446

Western States
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415)348-8222
In Texas call (713)731-2605

Southern California
Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90274
(213)378-8361

Mid-Atlantic, Northeast
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617)848-9306

Midwest
Mike Kleeblatt
The Pattis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646

New York Metropolitan Area
Nelson & Miller Associates, Inc.
55 Scenic Dr.
Hastings-on-Hudson, NY 10706
(914) 478-0491

Southeast
Mark Browning
Browning Publications
P.O. Box 81306
Atlanta, GA 30366
(404) 455-3430

Canada
Frank Lederer
The Pattis Group
122 St. Patrick Street
Suite 207
Toronto, Ontario MST 2X7
(416) 598-4289

attention authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

microform

Creative Computing is available on permanent record microfilm. For complete information contact University Microfilms International, Dept. F.A., 300 North Zeeb Road, Ann Arbor, MI 48106 or 18 Bedford Road, London WC1R 4EJ, England.

foreign customers

Foreign subscribers in countries listed below may elect to subscribe with our local agents using local currency. Of course, subscriptions may also be entered directly to Creative Computing (USA) in U.S. dollars (bank draft or credit card). All foreign subscriptions must be prepaid.

Many foreign agents stock Creative Computing magazines, books, and software. However, please inquire directly to the agent before placing an order. Again, all Creative Computing products may be ordered direct from the USA—be sure to allow for foreign shipping and handling.

CANADA	**Surface**	**Air**
1-year	$29.97	n/a
2-year	53.97	n/a
3-year	72.97	n/a

AUSTRALIA	**$A**	**$A**
1-year	32	92
2-year	58	n/a
3-year	80	n/a

ELECTRONIC CONCEPTS PTY., LTD.
Attn: Rudi Hoess
Ground Floor 55 Clarence St.
Sydney, NSW 2000, Australia

ENGLAND	**£**	**£**
1-year	15	30
2-year	28	n/a
3-year	40	n/a

CREATIVE COMPUTING
Attn: Hazel Gordon
27 Andrew Close
Stoke Golding, Nuneaton CV12 6EL

GERMANY	**dm**	**dm**
1-year	83	177
2-year	152	n/a
3-year	208	n/a

HOFACKER-VERLAG
Ing. W. Hofacker
8 Munchen 75
Postfach 437, West Germany

ITALY	**IL**	**IL**
1-year	44,100	94,500
2-year	80,600	n/a
3-year	110,900	n/a

ADVEICO S.R.L.
Via Emilia Ovest, 129
43016 San Pancrazio (Parma) Italy
Attn: Giulio Bertellini

JAPAN	**Y**	**Y**
1-year	8,250	23,600
2-year	15,100	n/a
3-year	20,700	n/a

ASCII PUBLISHING
Aoyama Building 5F
5-16-1 Minami Aoyama, Minato-Ku
Tokyo 107, Japan

PHILIPPINES	**P**	**P**
1-year	289	827
2-year	529	n/a
3-year	727	n/a

INTEGRATED COMPUTER SYSTEMS, INC.
Suite 205, Limketkai Bldg., Ortigas Ave.
Greenhills P.O. Box 483, San Juan
Metro Manila 3113, Philippines

OTHER PARTS OF ASIA AND THE FAR EAST	**US$**	**US$**
1-year	34.97	99.97
2-year	63.97	n/a
3-year	87.97	n/a

ALL OTHER COUNTRIES	**US$**	**US$**
1-year	34.97	99.97
2-year	63.97	n/a
3-year	87.97	n/a

CREATIVE COMPUTING
P.O. Box 789-M
Morristown, NJ 07960, USA

INTRODUCING PERFECT WRITER™. NOW, GET THE FINEST WORD PROCESSOR AT ANY PRICE FOR JUST $289.00

AND GET OUR INCREDIBLE, MONEY-BACK GUARANTEE!

That's right. If you own an Apple II, Heath/Zenith, TRS-80 model II, North Star, Osborne 1, Superbrain, Micropolis/Vector, or CP/M 8," you can now afford the most advanced, yet easy-to-use, word processor on the market today.

But don't take our word for it. See for yourself.

We're so sure you'll be amazed by Perfect Writer's easy-to-use features and capabilities, that we'll let you try it for thirty days and give you your money back if you're not completely satisfied!

FEATURES AND FLEXIBILITY YOU HAVE TO SEE TO BELIEVE.

Looking for the advanced features you'd expect to find in the most expensive word processors? Perfect Writer has them. Like automatic formatting of letters, out-lines, reports, memoranda, articles, books, or other types of documents.

What makes Perfect Writer unique, are the features you won't find in word processors costing many times its price.

Like the incredible sophistication of Virtual Memory Architecture, that lets you edit a full-length novel as easily as you'd edit a letter.

Or a remarkable breakthrough called Split Screen Editing™ that lets you divide the screen into two parts, each showing a different document, and transfer sections of text between the two!

Perfect Writer.
The remarkable word processor combining sophistication and simplicity.

And that's just the beginning. Perfect Writer offers much, much more:

- Automatic numbering of pages, chapters, sections, footnotes, internal page references, and automatic generation of table of contents and indexes.
- Mail merging capability allows generation of form letters and more.
- Automatic carriage return, auto-centering, tab setting, and automatic placement of footnotes.
- Quick and easy cursor commands.
- Easy deleting and inserting procedures.
- Safe and convenient storage of materials.
- Searches for and replaces words and phrases in a document, including near misses.
- Full range of printing options, including right margin justification, micro-spacing, super and subscripts, italics, and bold face.
- And lots more.

MONEY BACK GUARANTEE.

Try Perfect Writer for 30 days at our risk. If you're not completely satisfied, return it for a prompt, complete refund.

PERFECT WRITER IS EASY TO USE. WE GUARANTEE IT.

When we say that Perfect Writer is easy to use, we mean it. That's why we're not afraid to offer a money back guarantee.

You see, Perfect Writer was designed to be simple. In fact, you don't even have to read our crystal-clear manual in order to use Perfect Writer. The pictures, diagrams and illustrations tell you all you need to know, so you're off and running in no time.

There are no difficult and awkward procedures and commands to learn. We guarantee it.

ORDER NOW. WHAT HAVE YOU GOT TO LOSE?

If you'd like to own the most sophisticated word processor on the market today at the current, introductory price of just $289.00, we invite you to order now.

Perfect Writer is completely guaranteed, so there's no risk of any kind. Why not see for yourself what this incredible new software breakthrough can do for you?

TO ORDER CALL TOLL FREE: 1-800-221-2486
IN NEW YORK CALL: 1-212-619-4000

WRITE: COMPUTER SERVICES CORPORATION OF AMERICA
71 MURRAY STREET
NEW YORK, NEW YORK 10007

Yes. I want to see for myself if Perfect Writer is as great as you say it is. So please send it to me, subject to the guarantee printed on this page.

☐ Perfect Writer and Manual $289.00

I also want to order, subject to the same guarantee:

☐ Perfect Speller $189.00 ☐ Perfect Sort $189.00
☐ Perfect Mailer $189.00

Name_____

Address_____

City, State, Zip_____

☐ MasterCard ☐ American Express
☐ Visa

Number_____ Expires_____

TRY THESE OTHER PERFECT SOFTWARE PRODUCTS

(THE SAME MONEY BACK GUARANTEE APPLIES).

Perfect Speller™: The best automatic proofreader available! Perfect Speller uses its 20,000 word dictionary to proofread your document and catch all your spelling mistakes. (Dictionary size limited only by your system's storage capacity.) You can add words to the dictionary, build separate dictionaries, change the dictionary, and more. $189.00 guaranteed.

Perfect Mailer™: It's more than a mail merging or form maintenance system! Perfect Mailer can organize and sort your correspondence, develop sophisticated mailing systems, and keep track of your correspondence. Don't miss this remarkable new software innovation! $189.00 guaranteed.

Perfect Sort™: Here's a sort/merge/extract program that operates on all kinds of data! Records can be fixed or variable, with a variety of variable length fields. Files can be examined using comparison and logical operators. Want speed and efficiency? You've got to have Perfect Sort! $189.00 guaranteed.

© 1982 Computer Services Corporation of America

CIRCLE 130 ON READER SERVICE CARD

utput...input/output...input

Likes the Thrust

Dear Editor:

Some praise and a plea...I subscribe to six or seven computer magazines, all of which are good and useful. But I have to write to encourage you and *Creative Computing* to hold to your philosophy (e.g., Eugene Raudsepp's essays, or Ted Nelson on design concepts and such).

No other magazine has the creative, imaginative, and humanistic thrust that yours does. To those of us who are not scientists, engineers, business people, or technicians your commitment to the individual and to imagination—commercially viable or not—is reassuring and an essential counterweight to the dangers this exploding technology brings with its growth.

I hope you'll persist in support of ideas, feelings, and people-oriented speculations on the sane and human possibilities of this new spiritual challenge to civilization.

Ned Davison
1373 Butler Ave.
Salt Lake City, UT 84102

De-bugging the Brain

Dear Editor:

Your excellent article, "Overcoming Blocks and Barriers to Creativity" by Raudsepp (March and April '82), is a significant find in a computer magazine, emphasizing that the revolution is not only technological.

You recognize that we are dealing with an exciting revolution in consciousness. Just as we no longer find slow, limited machinery sufficient, and are evolving everything from the kitchen stove (which, like the wristwatch, talks) to the typewriter (which remembers) to the entertainment industry and the assembly line, the constant study of logic which has made the revolution possible has made us realize that we must improve our internal software: the programs and operating system in the mind. Including Raudsepp's article vindicates your title, *"Creative" Computing*.

Anton Brezinski
6050 Academy Ave.
Riverside, CA 92506

Palpitating, Maybe...

Dear Editor:

Although it would take an article of equivalent length to correct the inaccuracies and errors in detail, I wish to thank *Creative Computing* for Ted Nelson's report on Siggraph/81. Ted clearly got across the intensity of our yearly gathering. I hope he is sent to Siggraph '82 (Boston, July 26-30) as well.

Ted advocated a low-cost Siggraph to his readers. We have a better idea. Anyone can order four hours of the latest computer graphics on videotape from Siggraph (details: T. Defanti, UICC/INFE, Box 4348, Chicago, IL 60680) and hold a local computer graphics extravaganza, thus neatly avoiding the travel and registration costs associated with any large conference.

One thing in Ted's article did confuse me, however. I simply can't understand Ted not identifying with "palpitating blobs"!

Tom DeFanti, Chairman, Siggraph
Association for Computing Machinery
1133 Avenue of the Americas
New York, NY 10036

The IBM Personal Computer

Personal, Professional, Technical — or somewhere in between ... PC-MATE™ makes the IBM Personal Computer a perfect match

PC-MATE™ from TECMAR is the first and only complete expansion series available for the IBM Personal Computer. There are currently more than twenty PC-MATE™ expansion options available, and new products are continuously added to the list.

When you want more from your IBM Personal Computer, look to PC-MATE™.

You can create a SUPER PERSONAL COMPUTER with household lights and appliance control, voice output, and give it more memory than any ordinary personal can handle.

Or make it a PROFITABLE PROFESSIONAL SYSTEM with expansion space and a Winchester disk to handle more business accounts. Increase memory up to the system limit and process those accounts faster. Add flexible I/O interfaces and put yourself on line to outside information sources.

As an INTELLIGENT LABORATORY TOOL with interfaces to IEEE 488 instrumentation, analog signals, stepper motors and video signals, your IBM Personal Computer becomes the perfect workbench assistant.

Hardware, Software, Accessories — PC-MATE™ provides the highest quality and the greatest possible range of functionality for the IBM user.

Ask your local computer store for more information on the PC-MATE™ series from TECMAR, or call for the name of your nearest authorized PC-MATE™ dealer.

PC-MATE™ EXPANSION OPTIONS

Personal Computer Expansion Chassis (see photo)
192K and 256K Dynamic Memory with Parity
Winchester Disk Drive and Controller
Parallel Medium Speed Input/Output Interface
Serial Medium Speed Input/Output Interface
Parallel High Speed Input/Output Interface
Serial High Speed Input/Output Interface
Analog to Digital Converter - 8, 12, 14, 16 Bit
Dust Cover Set for IBM PC and Peripherals
High Speed Static Memory (RAM/ROM)
Digital to Analog Converter - 8 and 12 Bit
Multi-System Printer Sharing Facility
CMOS Memory with Battery Backup
System Clock with Battery Backup
Electrically Erasable EPROM
BSR X-10 Device Controller
Stepping Motor Controller
Video Image Digitizer
IEEE 488 Interface
Prototyping Board
Music Synthesizer
Voice Synthesizer
Extender Board

One Year Warranty

Additional products are already under development, so if we don't have what you need, chances are good that we soon will.

CIRCLE 252 ON READER SERVICE CARD

Tecmar Inc. PERSONAL COMPUTER PRODUCTS DIVISION
23600 Mercantile Rd., Cleveland, OH 44122 (216) 464-7410

utput...input/output...input

ROM & Board

Dear Editor:

I read the article on "Text and Graphics" for the Apple and Epson in the February 1982 issue of your magazine. In the article the statement was made that the Epson MX-80 Graftrax ROMs would not work with the 8141 interface. I have found this not to be entirely true.

I bought the Graftrax ROMs to place in my Epson and opted not to purchase the more expensive 8150 interface. I have found that all the features of the ROMs are available with the exception of dot graphics.

This was quite satisfactory to me as I did not purchase the ROMs to use the dot graphics. I mainly do documentation and text processing and did not need graphics but wanted the other features.

If you currently have an Epson MX-80 and want the additional features, but do not need dot graphics you can get by on the 8141 interface.

As a side note I am running a Heath H-89 system. Since HDOS is a device-independent operating system I was able to modify another printer drive and link it into HDOS. This provides me with the ability to handle the features of the Epson and pass all characters to the printer. For any other users of the Heath computers I have this driver available in a multi-unit configuration available for $15.

Raymond H. Thompson
12260 Welcome Drive
San Antonio, TX 78233

Remapping AWACS

Dear Editor:

In the article "AWACS" by John Hitchcock in the May 1982 issue, the author mentioned a problem he had with the map display. As the number representing the planes crossed the map, they erased the portions crossed. This problem is caused by the method used to move the numbers: drawing on top of them with HCOLOR=3 (white) in line 460.

This problem can easily be alleviated by using the XDRAW command, which exclusive-ors the shape with the current display. XDRAWing once draws the shape, and XDRAWing on top of it erases it and restores whatever was on the screen in the first place. The only possible difficulty with this method is that the display will be erased temporarily where the shape is drawn on top of it. However, this is not a difficulty for me; I find the display easier to read with this effect.

The program can be easily modified to use this method. Line 750 should be removed and lines 270 and 460 should be replaced with "XDRAW D%(R,7) AT D%(R,5),D%(R,6)".

Walter R. Smith
3597 Knollwood Hill Dr.
Chattanooga, TN 37415

Back to the Drawingboard

Dear Editor:

Thank you for printing "Graphics Drawingboard" (Feb. 82) by William E. Bailey. The program is useful and imaginative. Mr. Bailey is to be congratulated.

I have modified the program slightly to allow the user to save the "PRINT AT" locations and the ASCII codes generated by the program to a sequential disk file. The file can be used to produce the graphics display without the need to type the locations and codes into a program.

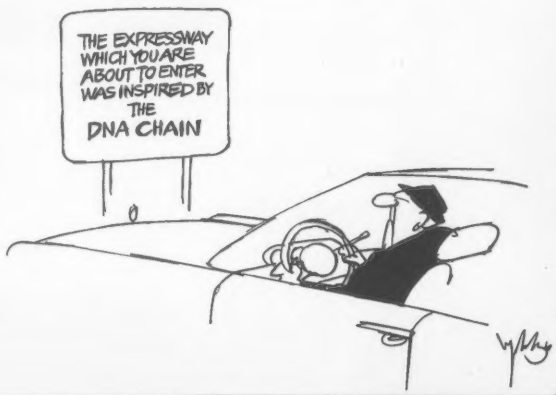
The following modifications to Mr. Bailey's program save the output to disk (I used a TRS-80 Model III).

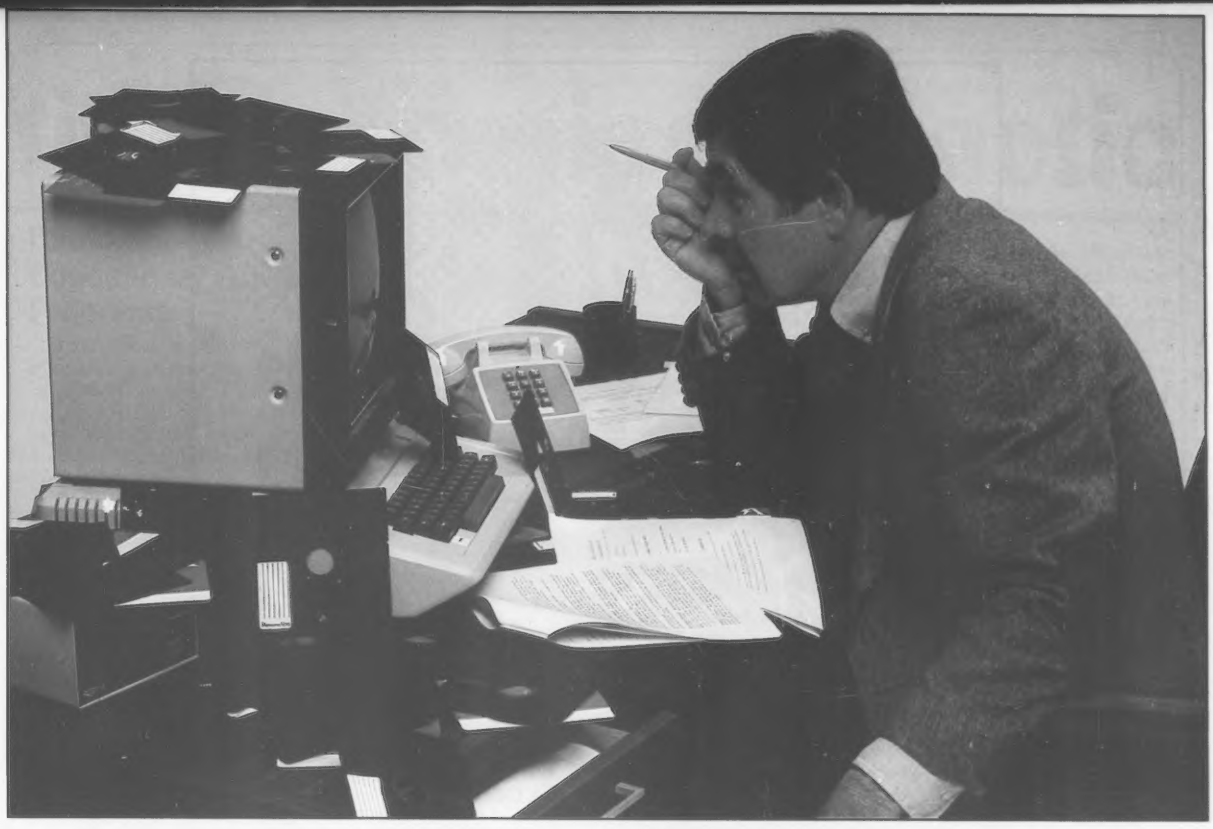
```
10 I=0:LN=128:L=480:DIM   LO(1023):C=1:DIM  Z(1023):DIM  V(1023)
912 NR = NR+1    'COUNT NO. OF "SET" LOCATIONS
914 Z(NR) = I: V(NR) = LO(I)
1030 INPUT "(A)dd to picture, (S)ave, or (E)nd";B$
1040 IF B$ = "E" THEN END
1042 IF B$ = "A" THEN 1050
1045 IF B$ = "S" THEN 2000
2000 CLS: INPUT "FILENAME";F$
2010 OPEN "O", 1, F$
2020 FOR I = 1 TO NR
2030   PRINT #1, Z(I);V(I)
2040 NEXT
2050 CLOSE
2060 END
```

The following program accesses the file created and produces the graphics display. It can be used as a subroutine as well as a stand-alone program. If used as a subroutine, line 20 would probably be eliminated in favor of specifying the file-name in the "OPEN" statement, line 30.

```
10 CLS
20 INPUT "FILENAME";F$
25 CLS
30 OPEN "I", 1, F$
40 IF EOF(1) THEN 90
50   INPUT #1,Z,V
60   PRINT@Z,CHR$(V)
70 GOTO 40
90 CLOSE
```

Rod Rode
9815-98 Ave.
Edmonton, Alta.
Canada
T5X 3A3





We don't make a Winchester for just anybody.

We're Corona Data Systems and we've made Starfire, a Winchester disk just for Apple II*.

What's in it for you?

5 million characters of storage. And that's not all. You'll get Corona's Disk Partitioning which allows for up to 16 separate operating systems such as Apple DOS, CP/M*and Pascal, all sharing the same disk. Of course, you'll still be able to use DB Master*and protected software like VisiCalc*.

Double Size Volumes.

And with our Double Size Volumes, your Apple DOS is transformed into something special that offers larger data files. And you'll never have to type commands like "catalog" and "run" or type program names again. You can even forget what volumes the programs are in.

Reliability.

But you'll never forget Starfire's reliability. That's because we built DataGuard,* the feature that will correct errors, not just report them. And we also provide a one-year warranty that you can count on. That's reliability.

So why take chances? With Starfire, you're not just adding a hard disk to an Apple II, but transforming an Apple II into a full hard disk business computer.

corona
data systems

21541 Nordhoff Street, Unit B Chatsworth, California, 91311 (213) 998-0505

Starfire – the Winchester disk made just for Apple II.

CIRCLE 140 ON READER SERVICE CARD

*Starfire and DataGuard are trademarks of Corona Data Systems *Apple II is a registered trademark of Apple Computers, Inc. *VisiCalc is a trademark of Personal Software Inc.
*CP/M is a registered trademark of Digital Research, Inc. *DB Master is a trademark of Stoneware

Alien ambush™

WHAM
ALONE IN AN UNCHARTED GALAXY, YOU'RE SUDDENLY AMBUSHED BY AN ALIEN MARAUDER. INSTINCTIVELY, YOU FIRE YOUR LASERS. HITTING THE ATTACKER, YOU WATCH IN HORROR AS IT SPLITS INTO TWO MENACING CRAFT. YOU GROW DESPERATE AS MORE ALIENS CAREEN TOWARDS YOU...

by Peter Fokos

You haven't lived until you've died in space.

And here's your chance.

Software author Peter Fokos has created Alien Ambush, a space age nightmare. This hi-res, full-color arcade game is written completely in assembly language to give those nasty aliens every advantage.

So if you have access to a 48K Apple* with DOS 3.3, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: It just got a lot tougher to survive in space.

Available at finer computer stores everywhere. *Apple is a trademark of Apple Computer, Inc.

CIRCLE 180 ON READER SERVICE CARD

tices...notices...notic

Radio Shack Announces Educational Grants Program

Radio Shack, a division of Tandy Corporation, is committing $500,000 worth of TRS-80 computer equipment to a program designed to encourage and support the successful application of microcomputer technology in U.S. educational institutions.

The **Tandy TRS-80 Educational Grants Program** will award TRS-80 hardware, software, courseware and related products to individuals or non-profit educational institutions whose proposals are selected as providing the greatest benefit to the American educational community.

An impartial Educational Grants Review Board has been established to review submitted proposals and make recommendations for equipment allocation.

An information packet containing a cover letter, TRS-80 brochure, catalog, submission information and a proposal cover sheet will be forwarded in response to initial inquiries.

The first of the quarterly sittings of the Review Board will evaluate proposals addressing "Computer Literacy Among Teachers." Deadline for submissions is June 30. For information regarding proposal content and format, contact: Tandy TRS-80 Educational Grants Program, Radio Shack Education Division, 400 Tandy Atrium, Fort Worth, TX 76102.

Newspaper Syndicate Signs Archibald

Dale Archibald, contributing editor of *Creative Computing* may soon be in your local newspaper.

Archibald recently signed a contract with the Field Newspaper Syndicate to supply a weekly column to newspapers around the country. He said wryly, "I'm joining a select group that includes Ann Landers, Erma Bombeck, Sylvia Porter, The Wizard of Id, and Dennis the Menace."

In his column for Field, he will review all types of software and hardware from the non-technical viewpoint. The column will feature game and other programs (especially those available for a variety of machines), new hardware, simple tips, press release information, and anything else of interest to non-owners and owners alike.

Educational Software Contest

Krell Software has announced an educational software contest, with 90 prizes totaling $30,000 worth of software to be awarded.

There are four general categories: Arts, Humanities and Philosophy; Social Sciences; Math/Natural Sciences; and Logo and other topics.

All entries must be received before December 1, 1982.

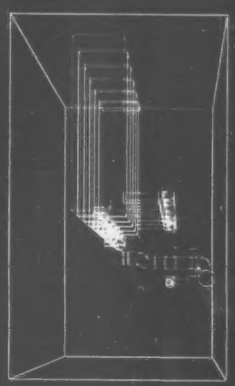
For full details on the contest, write: Krell Software Corp., 21 Milbrook Dr., Stony Brook, NY 11790.

DATA PLOTTING SOFTWARE

DATA PLOTTING ON MICROS — A collection of programs to process and display all types of data: bar charts, stock market charts, engineering and scientific data, 3D views of surfaces, pie charts, sorting, filtering, running averages, curve fitting, and more. Application to business, engineering and science. All program listings are in BASIC fully documented and keyed to theory. Use them as-is or modify for your own applications. This is one of the most complete collections of data plotting programs available anywhere — and the source code is fully documented!
Book - $24.95; Disk - $19.95.

ENGINEERING SOFTWARE

ENGINEERING SOFTWARE FOR MICROS — A self-teaching guide to developing software for engineering applications of microcomputers. Emphasis is on combining graphics with engineering problem solving. Programs included to interactively create engineering drawings, store on disk file, recall, modify and merge. Other programs for simulation, mechanisms design, heat transfer, circuit analysis, optimizations and including Monte Carlo techniques. Programs for Fourier analysis display frequency spectra graphically. This is a valuable collection of modern engineering analysis software for students and professionals.
Book - $28.50; Disk - $19.95.



KERN PUBLICATIONS
190 Duck Hill Rd
Duxbury, MA 02332

GRAPHIC SOFTWARE

GRAPHIC SOFTWARE FOR MICROCOMPUTERS — This self-teaching guide will show you how to write your own graphics software. 61 programs for 2D and 3D graphics: interactive input, translations, rotation, isometric views, perspective, scaling, stretching, clipping, surface intersections, shading, hidden line removal, tablet software, animation and more. Applications to science, engineering and business. All programs in BASIC fully documented. Modify and combine to suit your own applications. *"One of the most outstanding books on computer software" — A. Grund, U. Illinois; "The best book available on microcomputer graphics" — Creative Computing Feb, 1982.*
Book - $21.95; Disk - $18.95.

STRUCTURAL ANALYSIS SOFTWARE

STRUCTURAL ANALYSIS ON MICROS — This self-teaching guide contains a series of programs which calculate stresses and deflections in beams, plates, trusses and frames using conventional and matrix techniques. Theory, equations and program listings fully documented. Written for the non-specialist who wants to use his micro for structural analysis with minimum investment in time. Use the programs as is or modify for your own applications.
Book - $39.95; Disk - $19.95.

Books contain fully documented program listings in BASIC with theory and equations. **Disks** contain the same programs as the books but without documentation. When ordering disks, please specify APPLE II Plus 48K DOS 3.3 or IBM. To order, send check drawn on U.S. bank, money order in US funds. **Visa** or **Mastercard** number with expiration date to **KERN PUBLICATIONS** 190 Duck Hill Road, P. O. 1029A, Duxbury, MA 02332. Add $2 per book 4th cl postage in US and Canada; $3 1st cl or UPS in US; $4.50 1st cl Canada; $12 air Europe and Central America; $18 elsewhere. **Call (617) 934-0445 for faster delivery.**

CIRCLE 170 ON READER SERVICE CARD

Color Graphics for S-100 Computers

David S. Repsher

S-100 bus users, take heart. At long last there is a low-priced, high-resolution color graphics board available for your computer. It is your reward for years of patience.

I had wanted color graphics capability for my Imsai since assembling it in 1976, but I resisted the low-resolution, high priced Cromemco Dazzler. I was envious when the Apple and its imitators appeared on the market.

S-100 users were faced with a price barrier that seemed impenetrable. Some devices had high-resolution capabilities that only NASA could fully exploit. All had price tags that only NASA could afford.

Enter Quest. In an unobtrusive corner of an ad that appears regularly in the pages of this magazine, they offered a color graphics board. If it were any good, I figured, it would be highly touted. But for $100, I decided to take a chance.

For that $100, Quest Electronics (P.O. Box 4430X, Santa Clara, CA 95054) will sell you the Super Color S-100 Video kit. This includes 1K of 2114 static memory — enough to do low-resolution graphics. On-board memory is expandable to 6K with the addition of 10 more 2114 chips with sockets, and two 7805 voltage regulator chips. These may be purchased from Quest or any other parts supplier to give the board a resolution capability of 256H x 192V. Total cost of a 6K color board is less than $200 — remarkable.

Hardware Considerations

Although the board utilizes just 6K of RAM, it occupies an 8K block of memory (dip switch selectable to any 8K boundary). Another option allows a 2758 or 2716 of ROM to occupy the top 2K of the address space of the board. It is only necessary to purchase the ROM and socket to implement this option. Another option allows for on-board RF modulation of the video signal. Quest makes the necessary parts available for $2.50 but advises that it does not advocate violation of any FCC regulations which their use may entail.

Thus, the board may be assembled to produce an RF modulated output to the tuner of a TV or a composite video output to a monitor or external modulator. There are also construction variations depending on whether the board will operate in an 8080/Z80 or an 1802 environment.

I had wanted color graphics capability for my Imsai since assembling it in 1976.

The documentation accompanying the board consists of a bound volume, the first part of which provides assembly instructions for the board and options. These instructions are clear and precise, and assembly presented no problems.

The board itself is clean and well laid out. Its uncluttered appearance reflects both the superior design engineering of Quest and the power of a pair of marvelous chips, the Motorola MC6847 Video Display Generator and the MC1372 Video Modulator.

What The Board Will Do

Because the Radio Shack Color Computer uses the Motorola chip set, a trip to the local Radio Shack will provide a demonstration of the capabilities of the Super Color board. However, if the Color Computer is only a 4K model, only the lower resolutions can be observed.

The various graphics modes available with the Super Color board along with the memory requirements of each are summarized in Table 1. It will be noted that eight colors are available only in the lowest resolution mode (64 x 32). The colors are red, green, yellow, blue, cyan, magenta, orange, and buff.

In this mode, alphanumeric characters may be intermixed with graphic blocks on a character-by-character basis (each character position is divided into 2 x 2 blocks). The characters are formed by a character generator on the MC6847 chip.

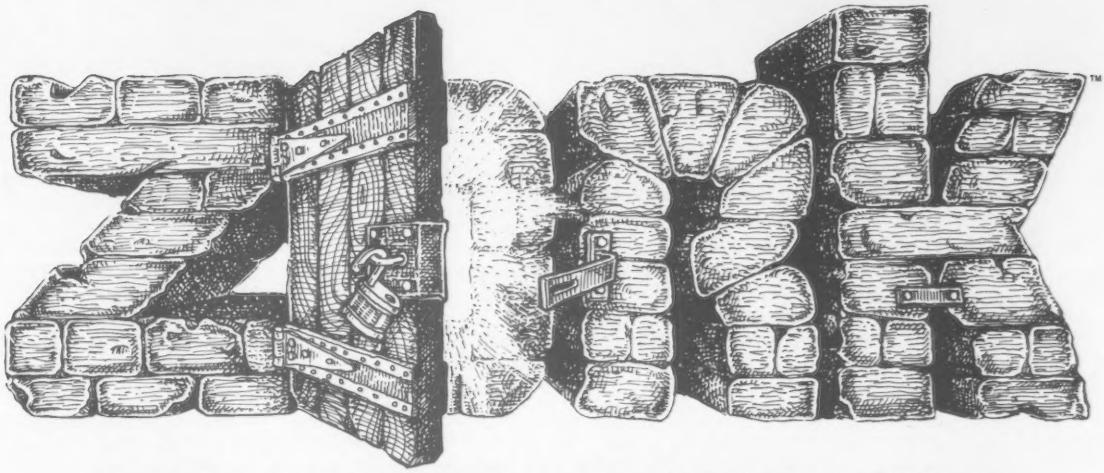
Those modes which display four colors offer the choice of red, green, yellow and blue or buff, cyan, magenta and orange. The two-color modes display buff and black or green and black.

Mode and color group selection is made by writing into one memory address on the board. However, this location, the highest address on the board, is not in RAM. Rather, it accesses a 74LS374 8-bit register.

The outputs of this chip control the mode select inputs of the MC6847 chip. Thus, if the board occupies memory locations E000H to FFFFH, then writing to location FFFFH would select the various display modes. Location FFFFH could not be read since it is not in memory.

David S. Repsher, 1915 Verde Street, Bakersfield, CA 93304.

Many are the doors that lead to the underground.



The top prose adventure bestsellers, ZORK I and ZORK II.

Now available for

Apple® II, ATARI®400/800, IBM Personal Computer, NEC PC-8000, CP/M,® and PDP™-11.

Few are they who come back alive.
Your greatest challenges lie ahead—and below. ZORK I: The Great Underground Empire, and ZORK II: The Wizard of Frobozz will transcend any computer age adventure you've ever encountered.

Those who live to tell the tale of ZORK's mysteries speak of becoming immersed in a dimension where the extraordinary is commonplace, and the dangers are as real as any in human experience. It is said that once you have known the forbidden realm, you are changed—and that he who dares ZORK's depths twice will never be the same again.

Now your door to ZORK has opened to beckon you below. The journey begins where Infocom's new worlds of INTERLOGIC™ prose adventure—including the new mystery thriller DEADLINE™—await you, at fine computer stores everywhere.

Apple is a registered trademark of Apple Computer, Inc. ATARI is a registered trademark of Atari, Inc. CP/M is a registered trademark of Digital Research, Inc. PDP is a trademark of Digital Equipment Corporation.

INFOCOM™
55 Wheeler Street, Cambridge, MA 02138

Open your door to the underground—here's $2 for openers!

To get your $2 ZORK rebate by mail, just send Infocom this coupon with your completed warranty card and sales slip from ZORK in their original form. No reproductions will be accepted. Limit 1 rebate for household, address or organization. Offer good only in U.S.A. Void where prohibited, taxed or otherwise restricted. Rebate request must be postmarked before midnight 7/31/82. Infocom is not responsible for lost, late or misdirected mail. Allow 4 to 6 weeks for delivery.

Infocom, 55 Wheeler St., Cambridge, MA 02138
OFFER EXPIRES JULY 31, 1982

A3

Display Mode	Resolution (H x V)	Number of Colors	Memory Required
Semi-4	64 x 32	8	½K
Semi-6	64 x 48	4	½K
One-C	64 x 64	4	1K
One-R	128 x 64	2	1K
Two-C	128 x 64	4	2K
Two-R	128 x 96	2	2K
Three-C	128 x 96	4	3K
Three-R	128 x 192	2	3K
Six-C	128 x 192	4	6K
Six-R	256 x 192	2	6K

Table 1. The various display modes available with the Super Color board and up to 6K of memory. Note that, for a given amount of memory, resolution may be traded off for more colors.

Locations E000H to F7FFH would then be display RAM. Locations F800H to FFFEH would be the space for the optional ROM.

Criticisms

Having operated the Super Color board for over a month, I have no complaints concerning its performance. In fact, my only criticisms concern the area of documentation.

While the construction manual was lucid, instructions for using the board can best be described as adequate. That is, the necessary information is there but it is difficult to piece together the big picture of just what is happening from what is essentially a collection of tables. I speak as one who has assembled and operated at least 20 S-100 boards and mastered the mysteries of CP/M. However, once the literature is muddled through, the board really is simple to operate.

Nowhere in the manual or Quest's ads is there any mention of the on-board ROM. I suppose a graphics driver routine could occupy this space but a letter to Quest asking for present or future plans for the ROM drew no response.

Neither is there any mention in their catalog or ad concerning the on-board RF modulator. One is only advised of this option in the literature accompanying the board. Then if one desires to implement this option (I did), completion of the board must await the arrival of the parts (about a week).

The most serious deficiency lies in the area of software. The manual includes a software listing in 1802 code for a video editor and listings in 1802 and CP/M-compatible 8080 code for driver routines. All of this code makes use of the alphanumeric capabilities of the color board, such as they are.

Few people will buy this board for its alphanumeric capabilities. A 32 x 16 display is of limited utility. Besides, a 64 x 16 board can be purchased for less than the color board.

This board will be purchased by those seeking a low cost, high quality, high-resolution color graphics board. And if it also has a limited alphanumeric capability, so much the better. Yet, Quest did not see fit to include even one line of code exploiting the graphics capabilities of the board. No demo. No driver routines. And this deficiency is made all the more ironic by the inclusion of the alpha driver routines. A letter to Quest on this matter again elicited no response.

Programming Considerations

Fortunately, programming the board is not difficult. The screen is memory mapped; the lowest memory location of the board corresponds to the upper left corner of the screen. Each successive memory location then corresponds to adjacent horizontal screen positions until the 32nd location. The next memory location displays at the left side of the next line. The number of lines, as well as the number of horizontal pixels controlled by each memory location, is a function of the resolution mode being used.

Again, mode selection is made by writing a byte to the highest (pseudo-) memory location on the board. The board can thus easily be used from Basic using PEEK and POKE statements. Of course, any memory location may also be read. The mode select byte, however, since it is not truly in memory, cannot be read. It can be considered a form of read-only memory.

A Sample Program

The program which follows will allow one to draw on the screen of a color TV using the cursor controls of the keyboard to position a blinking cursor. The program uses the highest resolution mode allowing four colors (128 x 196). The user is prompted on his terminal as to which group of four colors to use.

There is also the option of clearing the screen or not. If the screen is to be cleared, it may be cleared to any of the available four colors.

If one wishes to save the screen on disk, typing an S will transfer the screen memory to lower memory. It is there appended to a

```
                ;;;
```

VALPAR INTERNATIONAL

Admit it. We're jealous! We've all wished we could produce the mesmerizing graphics and irresistible games that the Atari is capable of handling. But it's not happening in Basic—and few of us can spend months writing machine code even if we know how.

The answer is Forth—the same high-level language used by Atari and others to program their arcade machines. Forth is *fast*, 15 to 20 times faster than Basic, and can make use of *every* capability of your computer. And it's no longer the province of the professional programmer!

Easy, *almost automatic*, access to graphics, animation, sound, and text handling can *now* be yours with ValForth and the additional packages, allowing you to create programs in an afternoon that would previously have taken weeks of hard work. And, unlike machine language programs, ValForth programs can be changed easily where you want to fine tune a particular effect or operation. Revisions that would be infuriating in machine language become trivial with ValForth.

WHAT? YOU DON'T ALREADY KNOW FORTH?

Then take advantage of our special offer on "Starting Forth" by Brodie. Widely acclaimed as the best book available on the subject, this entertaining treatment of Forth will make you comfortable with this exciting language quickly and easily. When you order *Starting Forth* you get a free copy of our "Notes for the ValForth User," including references, by page, to *Starting Forth*.

valFORTH

ValForth is an improved version of Atari's APX Forth and is upwardly compatible with it. ValForth was written by Steve Maguire and Evan Rosen of Valpar international in conjunction with Patrick Mullarky, the author of APX Forth. Specific improvements are:

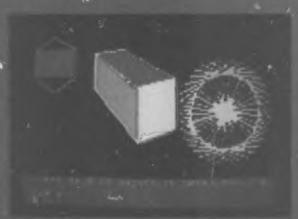
* Many important existing and new routines have been coded in 6502 for the high speed so necessary in graphics applications.
* Improved versions of selected routines such as ?TERMINAL, .S, and many more have been provided.
* *All* known bugs have been fixed.

As Dave & Sandy Small have said, "We plan to write our next game in ValForth."

GENERAL UTILITIES AND VIDEO EDITOR

* Utilities: An extensive package of extremely powerful, convenient routines. The list is too long to detail, but includes: four powerful CASE-type statements; four types of arrays; two "table" words; STICK (in 6502); RND, CHOOSE, and SHUFL random routines; SCRMOVE which allows moving a sequence of screens to a new location on the same or different disk with user verify and prompts; many words supporting string and number input from the keyboard (string handling, too!); SEC and MSEC delays, etc.
* Video Editor: A fast, powerful VIDEO screen editor, like MEMO PAD. (*Does not* use the slow Atari Operating System for displaying screens.) The Editor supports insert and replace modes and has a visible 5 line buffer. Makes editing a pleasure! (Requires ValForth)

PLAYER-MISSILE GRAPHICS, CHARACTER EDITOR, & SOUND EDITOR



With the Player-Missile Graphics package you can create, move position, color and change images of players and missiles at will with fast Forth commands! Automatic or user-controlled memory allocation options. All three widths are allowed and the 5th-player option is completely supported. Features high-level collision checks. Multicolor players are supported and explained, and interfacing with programs is *very* simple. Extensive implementation notes with examples are included.

The Character Editor allows fast composition (using the joystick) of character sets with a simultaneous display of the created characters. Sets may be saved to disk for later recall. It is, also, ideal for composing Player and Missile images.

The Sound Editor allows simple, simultaneous, independent control of all four variables of all four voices possible using one joystick per voice. Any single-setting sound of the Atari can be created with a graphical and a tabular readout. (Requires ValForth)

• • •

These are the exact utilities developed by Valpar International's professional software specialists and used to create our commercial software products. *Stay in touch with Valpar!*

DISPLAY FORMATTER

Allows simple generation of any possible combination of screen formats (DISPLAY LISTS). It combines character and graphics modes on one screen in seconds! You can create one display while showing another and modify DISPLAY LISTS at will. There are automatic or user-controlled memory allocation options. Also provided is simple formatting of DISPLAY LISTS for vertical and horizontal fine scrolling, and DISPLAY LIST interrupts, with notes on the implementation of these features. (Requires ValForth)

TURTLE & VALGRAPHICS AND ADVANCED FLOATING POINT ROUTINES

The package includes standard Turtle Graphics as in Atari Pilot. It also has advanced ValForth commands allowing line and point labeling, "turn-toward" and "two-line intersection" functions for vanishing point work, simplified move-and-fill commands, etc. Our Floating Point package expands on the original with: SIN, COS, TAN, ATN, and ATN2, sensible results generated by overflow and underflow, and other features. (Requires ValForth)

Text Compression and Auto Text Formatting

A unique, two-part utility!

* Text Compression allows the packing of text into much less space than normally required. Great for wordy Adventure games, "artificial intelligence," etc.!
* Auto Text Formatting takes both normal and compressed text and routes it to the video screen "windows." User options include: Number of windows (default is 16); window location, height, and width; text colors (for color models); inverse or normal video (for graphics 0 modes); left, right, or center justification; etc. Great for game "control panel readouts," promotional displays, etc.! (Requires ValForth)

*ValForth alone requires 24K.
ValForth plus one or more packages requires 32K minimum.

All products are now on non-protected disks.

Over 160 pages of detailed documentation!

ValForth	$39.95
General Utilities and Video Editor	34.95
Player Missile Graphics, Character Editor, and Sound Editor	39.95
Display Formatter	29.95
Turtle and ValGraphics and Floating Point Routines	34.95
Text Compression and Auto Text Formatting	29.95
Starting Forth (published at $15.95)	13.95
Heavy-Duty Professional Binder (provided free when ordering 3 or more packages)	8.95

Save almost $40.00!
With an order of all six packages you pay only $179.95!

When ValForth and one or more additional packages are purchased and proof of purchase of APX Forth is furnished, a $15.00 credit will be given.

VISA and MASTERCARD accepted.

VALPAR INTERNATIONAL
3801 E. 34TH STREET
TUCSON, ARIZONA 85713
Call Toll-Free 800-528-7070

Atari is a trademark of Atari, Inc., a division of Warner Communications.

CIRCLE 254 ON READER SERVICE CARD

Color Board, continued...

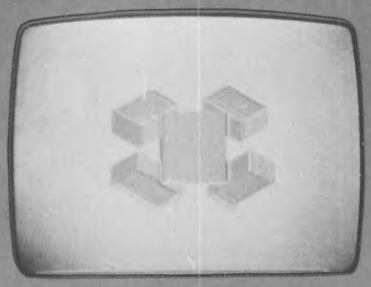


Photo 2A. Demo of graphics capabilities.

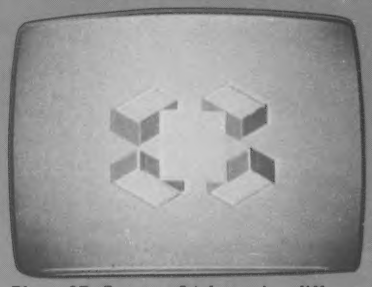
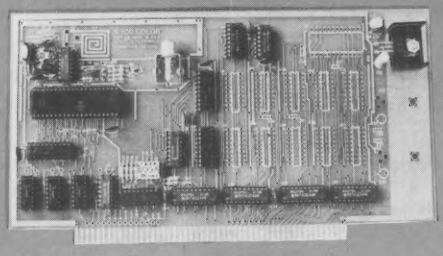


Photo 2B. Same as 2A but using different color group.



The Quest super color board.

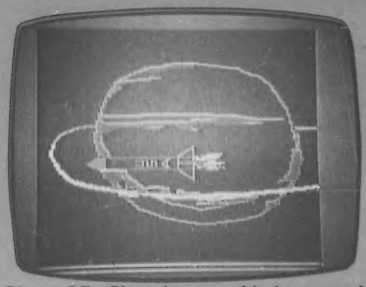


Photo 2C. Changing one bit in control byte...(to 2D)

Photo 2D. ...changes Photo 2C to Photo 2D.

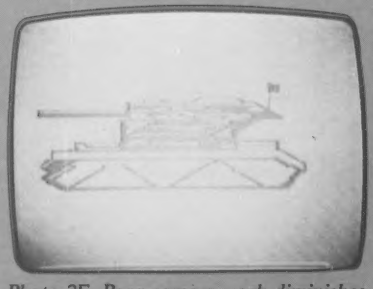


Photo 2E. Poor camera work diminishes display quality.

RAM

for ATARI®

ATARI 400*	32K BOARD	$149.00
	48K BOARD	$289.00
ATARI 800*	32K BOARD	$149.00
	64K BOARD (includes software)	$399.00
	128K BOARD (includes software)	$499.00

Featuring:

- ★ Complete software compatability.
- ★ Gold-plated contacts for life & dependability.
- ★ 90-day warranty.

The Memory Mill
P.O. Box 317
Potter Valley, CA 92469
Phone (707) 743-1666

Repair of the 400, 800.

Custom Designed software & hardware development systems for 400, 800.

FREE PRODUCT CATALOG, UPON REQUEST.

*ATARI, 400, 800 are Trademarks of ATARI, Inc.

CIRCLE 177 ON READER SERVICE CARD

galaxy of features

A GALAXY of features makes the **LNW80** a remarkable computer. As you explore the **LNW80**, you will find the most complete, powerful, ready to run, feature-packed personal and business computer ever made into one compact solid unit.

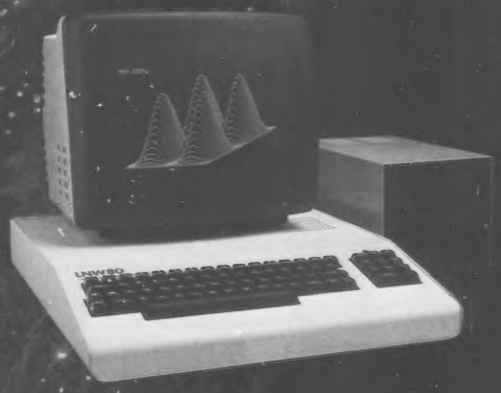
MODEL I COMPATIBILITY – The **LNW80** is fully hardware and software compatible with the Model I. Select from a universe of hardware accessories and software – from VisiCalc® to space games, your **LNW80** will launch you into a new world of computing.

FULLY LOADED – A full payload includes an on-board single and double density disk controller for 5 ¼" and 8" single or double sided disk drives. RS232C communications port, cassette and parallel printer interfaces are standard features and ready to go. All memory is fully installed – 48K RAM, 16K graphics RAM and 12K ROM complete with Microsoft **BASIC**.

QUALITY CONSTRUCTION – Instrumentation quality construction sets **LNW80** computers apart from all the rest. Integrated into the sleek solid steel case of the **LNW80** is a professional 74-key expanded keyboard that includes a twelve-key numeric keypad.

HIGH RESOLUTION GRAPHICS & COLOR – The stunning 480 × 192 resolution gives you total display control – in color or black and white. The choice of display formats is yours; 80, 64, 40 and 32 columns by 24 or 16 lines in any combination of eight colors.

PERFORMANCE – Lift-off with a 4MHz Z80A CPU for twice the performance. The **LNW80** outperforms all computers in its class.

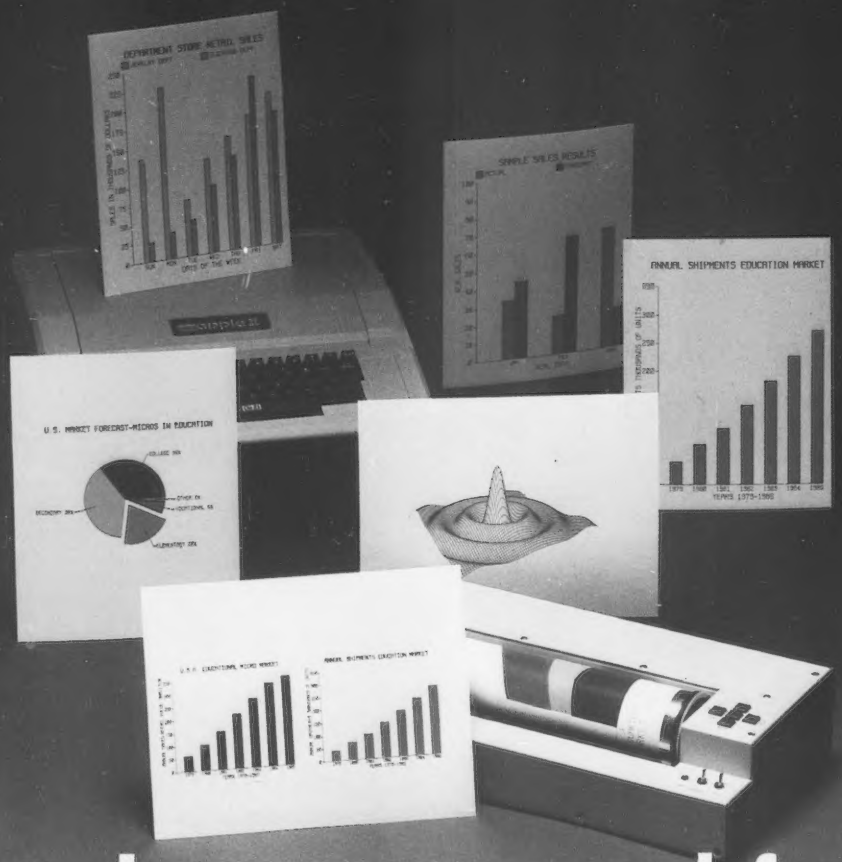


Our down to earth price won't send you into orbit

LNW Research Corp.
2620 WALNUT Tustin, CA. 92680
(714) 641-8850 (714) 544-5744

Monitor and Disk drives not included
TM Personal Software, Inc.

CIRCLE 173 ON READER SERVICE CARD

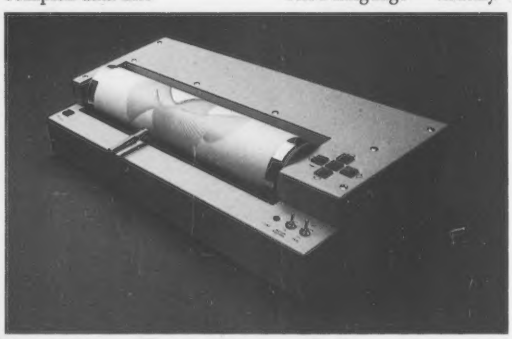


How to chart your company's fortune without spending one

It's a fact. A single chart or graph can tell you instantly what it takes hours to interpret from printouts or other raw data.

Now, with the Strobe 100 Graphics Plotter and Software package, you can create superb hardcopy graphics directly from your computer. And you can do it for an investment of only $995.

The Strobe System transforms complex data into dynamic, colorful visuals with a few simple commands from your computer. Charts and transparencies that once took hours to produce are plotted within minutes. Information can be presented as bar charts, pie charts, curves or isometrics in a variety of colors. And with a resolution of 500 points per inch, the Strobe 100 matches or surpasses the quality of plotters costing thousands of dollars more.



You can also save and modify your graphics through Strobe's menu-driven programs. A broad selection of software—including a VisiCalc*-compatible program—is now available.

When the Strobe Graphics System is interfaced to your computer, an 8-1/2 x 11 inch sheet of paper can speak anyone's language—visually. Visit your local dealer and learn how to start charting your fortunes today. Because a perspective on the present can also be your window on the future.

STROBE INCORPORATED

Strobe Inc.
897-5A Independence Avenue
Mountain View, CA 94043
Telephone 415/969-5130

The Strobe Graphics System

Seeing is believing

*VisiCalc is a trademark of VisiCorp.

CIRCLE 247 ON READER SERVICE CARD

Color Board, continued...

loader routine and the user is advised how to save the results as a CP/M .COM file.

Then, to display the picture at any time, one merely types the name of the picture. CP/M then loads the picture and reboots, and the Display program may be loaded. When asked whether the screen should be cleared, the user replies NO and may then continue the picture. This process may be repeated until the picture is done.

Typing a number from one to four will change the color of the cursor. To erase, the background color is selected. Then as the blinking cursor is moved, the other three colors are erased. Choosing color 0 will result in a transparent cursor. This is useful when several areas of different colors must be crossed, since the screen is not changed by the cursor. Typing C offers one the opportunity to change color grouping and to erase the screen.

Program Modification

The program was assembled at location 100H to run under CP/M. My own Super Color board occupies memory locations E000H to FFFFH. If the user's board is addressed at a different location, VIDBAS must be changed to reflect this.

DISEND must also be changed. DISEND is the page location of the board plus 18H. For example, if the board is located at page 50H (occupying locations 5000H thru 6FFFH), then DISEND is 50H+18H=68H. This is the end of the RAM space on the board.

Of course, CONST, CONIN, and CONOT must also be changed to call the user's own BIOS, and the ETX may need changing to reflect the REBOOT character of the user's console. The same may be true of the cursor control characters. The commented assembly listing for the program should serve to explain how it works as well as to point out other areas for possible change or enhancement.

Summary

The Quest Electronics Super Color S-100 board is an excellent piece of hardware. It is easy to program, requiring no complex decoding algorithm. The board performs flawlessly, permitting highly detailed screen graphics on an unmodified TV. It is in the area of software, however, that support is needed. I hope that more potential users of this board will stumble onto Quest's advertisement or this article. Then perhaps a software base or users' group may be created. At the very least, a market will be formed that would make it profitable for the talented pros to enter. Some of the fantastic software that is already out there for the appliance computers might also be translated for use by the board.

All of the fantastic potential which is the Super Color Board can only be exploited with imaginative software. It has been said, "software makes hardware happen." □

```
                        ;;;
```

PROOFREADER™
The Aspen Software Company Spelling Checker.
+
GRAMMATIK™
Beyond Spelling Checking

THE ONLY COMPLETE PROOFREADING PACKAGE

FOR ALL CP/M, MS-DOS, AND TRS-80 WORD PROCESSORS

We'll match Proofreader with any other spelling checker on the market. It has a big 38,000 word expandable dictionary, and can check even your largest documents in under four minutes. Proofreader looks up every word, and does not use less accurate root word analysis like some others. Full interactive correction is standard on CP/M and TRS-80 Model II systems, and is a low cost option for the TRS-80 Model I/III.

Spelling checking alone is not enough! No one else has anything like Grammatik! It analyzes your document for common typos, punctuation errors, misused phrases, and poor writing style. Grammatik is receiving rave reviews from both critics and users. Bob Louden in InfoWorld (12/7/81): "Grammatik is a surprisingly fast and easy tool for analyzing writing style and punctuation. If you are currently doing original writing on a word processor, you should consider this product." Eric Balkan in The Computer Consultant: "I'm impressed with the imagination that went into this product." A user: "Thanks for making my life easier!"

Grammatik and Proofreader are compatible with all CP/M, MS-DOS (including IBM PC), and TRS-80 word processors.
Current CP/M formats:
standard 8", NorthStar, Omikron TRS-80.
Please call or write for details of minimum system sizes, and availability of additional disk and operating system formats. Shipping costs included.
Please specify your system configuration when ordering. Dealer inquiries invited.
MS-DOS versions scheduled for March 1982 release.

	Proofreader	Grammatik
CP/M, MS-DOS	$129.00	$149.00
TRS-80 Model II	$99.00	$99.00
TRS-80 Mod. I/III	$54.00	$59.00

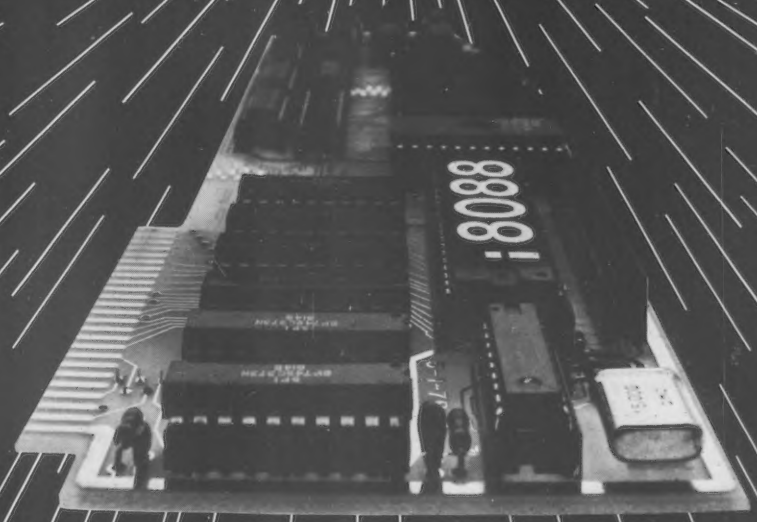
(Model I/III interactive correction option - $30.00)

Trademarks: CP/M: Digital Research; TRS-80: Tandy Corp.; Proofreader, Grammatik: Aspen Software Co.

ASPEN SOFTWARE COMPANY™
P.O. Box 339-C, Tijeras, NM 87059
(505) 281-1634

Color Board, continued...

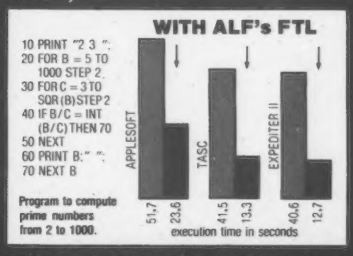
```
0192 CD8C02             CALL    DELAY   ;KILL TIME
0195 CD06C0             CALL    CONST   ;KEYBOARD INPUT?
0198 C49E01             CNZ     READ    ;IF SO, GET IT
019B C38701             JMP     BLINK   ;IF NOT, KEEP BLINKING
                ;;;
```



FTL makes Applesoft *faster!*

FTL is the easy way to speed up your Applesoft programs. You can run all your Applesoft programs with *no* changes, and without 'compiling' them. Plus, FTL doesn't reduce your available memory. The key is ALF's AD8088 Processor Card, which adds a fast, 16-bit computer to your Apple. FTL, the Formula Transfer Link, sends Applesoft formulas (*, /, ↑, LOG, EXP, COS, SIN, TAN, and ATN) to the card for fast processing. FTL runs programs that compilers won't, like programs with embedded assembly language. But FTL is compatible with most Applesoft compilers, so you can use **TASC** or **Expediter II** *and* FTL for even faster execution!

ALF's dependable Processor Card easily meets Apple's 2 watt power recommendation. The Apple's 6502 processor runs at full speed while the Processor Card runs programs from its on-board memories. Several AD8088's can be used simultaneously.



FTL is just one use for the powerful AD8088 Processor Card. There's a Multiple Event Timer (MET) for timing critical routines in your programs, with resolution to 50 µS for scientific applications. Coming soon are **MS-DOS** (the IBM Personal Computer's DOS), **CP/M-86**, and a fast 3-D high-res graphics card that connects through the AD8088's versatile expansion port.

$345 is the suggested price for the AD8088 Processor Card with FTL and MET. An Apple II with Language Card (or 16K RAM Card) and disk drive is required. See your local Apple dealer, or write for more information.

Trademarks: "Apple" Apple Computer, "TASC" "MS-DOS" Microsoft, "Expediter II" Einstein/Goodrow, "CP/M-86" Digital Research

ALF A L F Products Inc. 1448 Estes Denver, CO 80215 [303] 234-0871

Teaching young children to program... that's

ANTFARM

A programming language for teaching programming to kids (8 to 88!). The language embodies the best of modern logic structure in a simple entertaining format.

Kids have fun making the ant move, eat and plant in many interesting ways, while learning programming concepts formerly available only in universities.

A REMARKABLE REVOLUTIONARY TOOL FOR ELEMENTARY EDUCATION!

For 48K Apple with 16-sector drive, for UCSD P-Systems, for CP/M systems, user manual included. **$49.95**

Diet analysis... that's NUTRICHEC

A diet analysis program featuring:

- **physical activity level calculated from 90 activities**
- **based on 1980 R.D.A.**
- **748 common foods in data base, user expandable to 900**
- **displays & prints suggested and actual intake, nutrient quality - calories, fiber, fat, fat, protein, 5 vitamins, 6 minerals**

Comes with user manual. 32K Apple II, Applesoft, Dos 3.3 **$59.95**

Additional Information Available
Dealer Inquiries Invited
Please send check with order to:

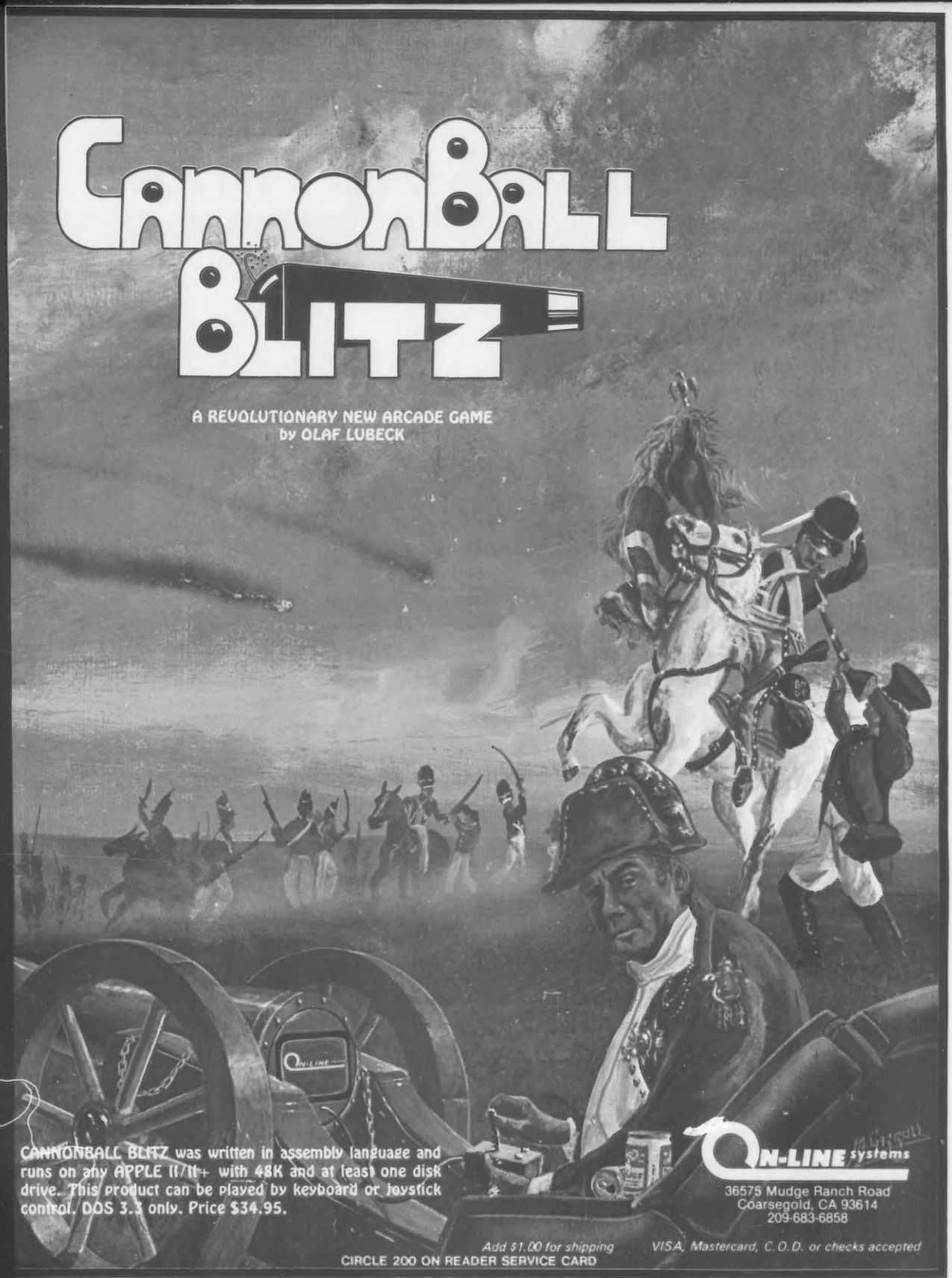
WMS®

Computer Consulting
6723 E. 66th Pl. • Tulsa OK 74133
(918) 492-9036

UCSD p-System TM of Univ. of Calif. Regents Apple II TM of Apple Computer Inc. CP/M is TM of Digital Research.

Color Board, continued...

```
0231 3A9802    LEFT    LDA     PNTR    ;GET 1 OF 4 CHAR PNTR
0234 B7                ORA     A       ;SEE IF IT IS LEFTMOST POS
0235 C23F02            JNZ     L1      ;NO
0238 2A9602            LHLD    ADSTR   ;YES, SO GOTO NEXT CHAR
023B 2B                DCX     H       ;MOVE LEFT 1 CHAR
023C 229602            SHLD    ADSTR   ;SAVE NEW ADDR.
023F 3D        L1      DCR     A       ;DOWN COUNT POINTER
0240 E603              ANI     3       ;MASK OFF 6 MSBITS
0242 329802            STA     PNTR    ;STORE NEW POINTER
0245 C35B02            JMP     PLOT    ;GO MOVE THE CURSOR
               ;
0248 219802    RIGHT   LXI     H,PNTR  ;GET CHAR. POS. PNTR.
024B 7E                MOV     A,M

024C 3C                INR     A       ;INCREMENT 1 TO RIGHT
024D E603              ANI     3       ;MASK OFF 6 MSBITS
024F 77                MOV     M,A     ;STORE NEW POINTER
0250 B7                ORA     A       ;SEE IF INC TO NEXT POS
0251 C25B02            JNZ     PLOT    ;NO, DISPLAY IT
0254 2A9602            LHLD    ADSTR   ;YES, GET OLD ADDRESS
0257 23                INX     H       ;POINT NEXT POSITION
0258 229602            SHLD    ADSTR   ;NOW DROP DOWN AND DISPLAY IT
               ;;;
```



CANNONBALL BLITZ was written in assembly language and runs on any APPLE II/II+ with 48K and at least one disk drive. This product can be played by keyboard or joystick control. DOS 3.3 only. Price $34.95.

ON-LINE systems

36575 Mudge Ranch Road
Coarsegold, CA 93614
209-683-6858

Add $1.00 for shipping *VISA, Mastercard, C.O.D. or checks accepted*

CIRCLE 200 ON READER SERVICE CARD

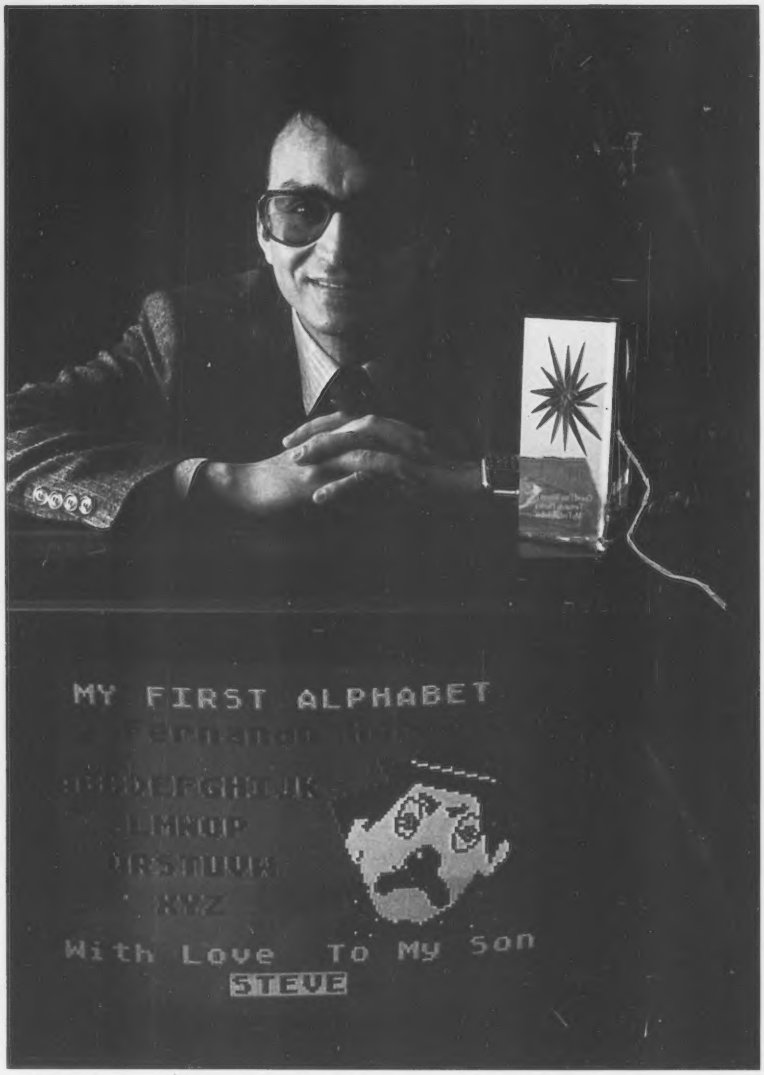
AN ATARI 800™ HOME COMPUTER AND A FATHER'S LOVE COMBINED TO HELP CHILDREN EVERYWHERE.

Fernando Herrera became the first grand prize winner of the ATARI Software Acquisition Program (ASAP) competition because he believed in computers, his son and himself.

The story of Herrera's success began with his son's sight problems. Young Steve Herrera had been born with severe cataracts in both eyes and, naturally, his father was concerned. Herrera reasoned that the boy's learning abilities could be seriously affected by growing up in a world he could not see.

Having just purchased an ATARI 800 Home Computer, it occured to Herrera that this could be the perfect tool for testing Steve's vision. So he wrote a program simply displaying the letter "E" in various sizes.

Success! It turned out that 2-year-old Steve could see even the smaller "E's" without special lenses. Herrera was first relieved, and then intrigued when he discovered that not only could his son see the "E's," but he would happily play with the computer-generated letters for hours. So Herrera added a picture of an elephant to go with the "E," and then more letters and pictures. Thus, "My First Alphabet" was born, a unique teaching program for children two-years and older consisting of 36 high resolution pictures of letters and numbers.



Herrera submitted the program to the ATARI Program Exchange, where it became an instant best-seller. ATARI was so impressed with the outstanding design, suitability and graphic appeal of "My First Alphabet," that the program is being incorporated into the ATARI line of software.

In addition to his grand prize winnings of $25,000 in cash and an ATARI STAR trophy, Herrera also automatically receives royalties from sales of his program through the ATARI Program Exchange.

But Fernando Herrera wasn't the only software "star" that ATARI discovered. Three other ATARI STARS were awarded at the ASAP awards ceremony for software submitted to the ATARI Program Exchange and

judged by ATARI to be particularly unique and outstanding.

Ron and Lynn Marcuse of Freehold, New Jersey, teamed up to write three winning entries in the Business and Professional category for home computers: "Data Management System," "The Diskette Librarian" and "The Weekly Planner."

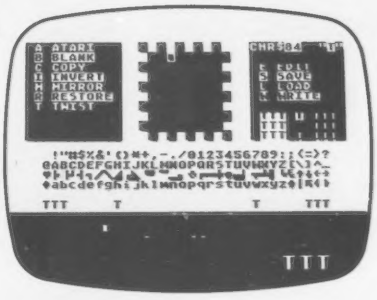
Sheldon Leeman of Oak Park, Michigan, captured an ATARI STAR for his exceptionally well-engineered "INSTEDIT" character set editor.

Greg Christensen of Anaheim, California, became our youngest ATARI STAR winner at the age of 17. Christensen designed the clever "Caverns of Mars" game program, which also will be incorporated into the ATARI product line. Greg designed the program in 1½ months after owning his ATARI Home Computer for less than a year.

Every three months, ATARI awards ATARI STARS to the writers of software programs submitted to the ATARI Software Acquisition Program and judged first, second and third place in the following categories: Consumer (including entertainment, personal interest and development); Education; Business and Professional programs for the home (personal finance and record keeping); and System Software.

Quarterly prizes consist of selected ATARI products worth up to $3,000, as well as an ATARI STAR, plus royalties from program sales through the ATARI Program Exchange. The annual grand prize is the coveted ATARI STAR trophy and $25,000 in cash.

To be eligible, your software idea must be accepted by the ATARI Software Acquisition Program. Your program can have a broad application or serve a very specific purpose.



After submittal, consultation from ATARI is available if you need personal assistance with sound, graphics, or other technical aspects of your program.

To make your job easier, ATARI provides some 20 software development tools through the ATARI Program Exchange. A list and description of the various system software is published quarterly in the ATARI Program Exchange Catalog. These tools enable you to utilize all the ATARI resources and software, including the six ATARI programming languages.

Fernando Herrera had a great idea that made him a star. ATARI would like to give you the same opportunity.

ATARI®
A Warner Communications Company

Enter the ATARI ASAP competition and you could win $25,000 in cash, royalties, some great prizes and an ATARI STAR.

SUBMIT TO: ATARI® Software Acquisition Program
Dept. C3R, P.O. Box 427
155 Moffett Park Dr., B-1
Sunnyvale, CA 94086

OR CALL: 800-538-1862; in California, 800-672-1850.

I'm reaching for the stars. Please send me an entry form today.

Name_____

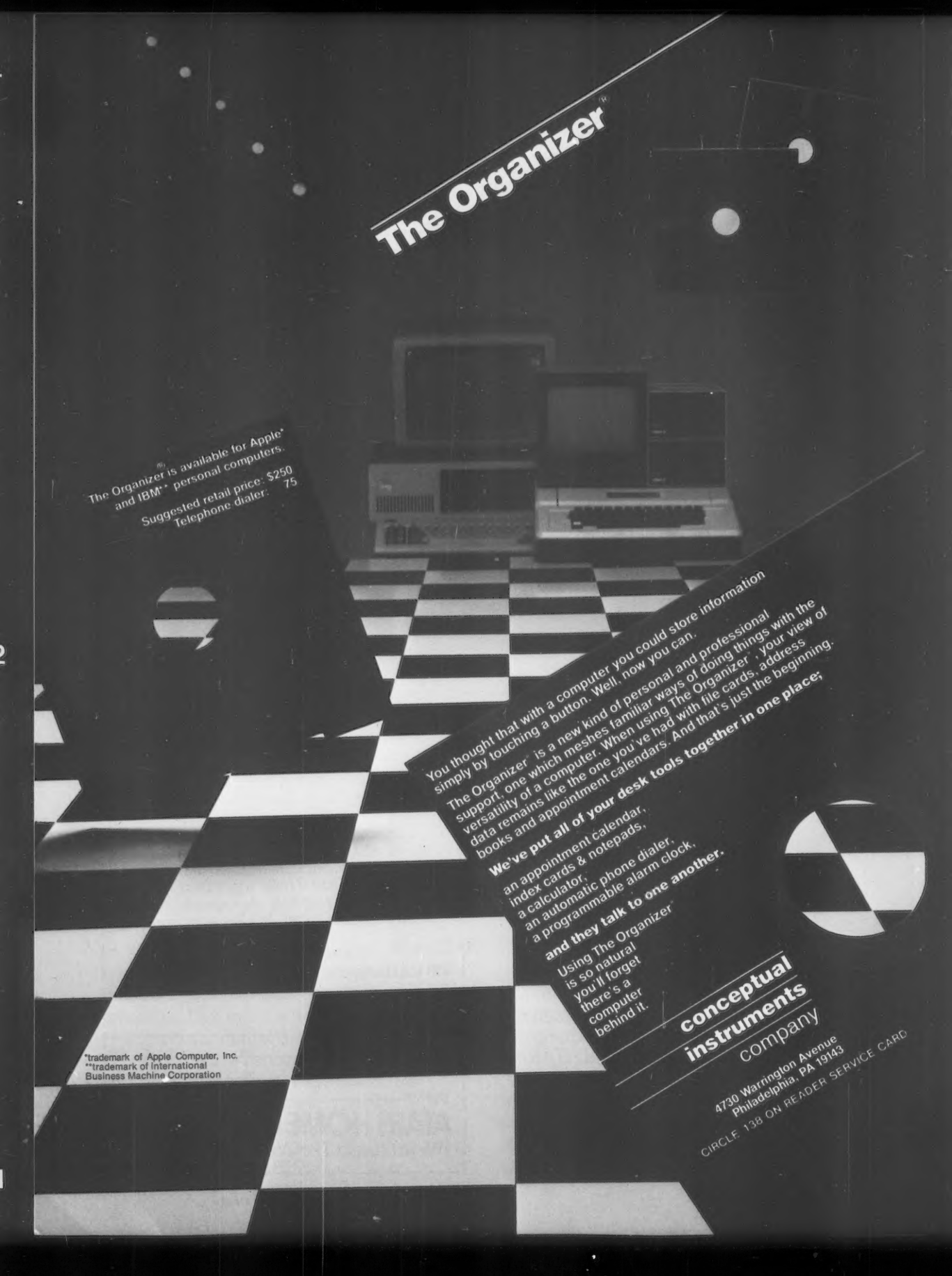
Address_____

City_____

State/Zip_____

ATARI HOME COMPUTERS
We've Brought The Computer Age Home.™
©1982 ATARI, Inc.

CIRCLE 109 ON READER SERVICE CARD


The Organizer®
The Organizer® is available for Apple* and IBM** personal computers.
Suggested retail price: $250
Telephone dialer: 75
You thought that with a computer you could store information simply by touching a button. Well, now you can.
The Organizer™ is a new kind of personal and professional support, one which meshes familiar ways of doing things with the versatility of a computer. When using The Organizer™, your view of data remains like the one you've had with file cards, address books and appointment calendars. And that's just the beginning.
We've put all of your desk tools together in one place;
an appointment calendar,
index cards & notepads,
a calculator,
an automatic phone dialer,
a programmable alarm clock,
and they talk to one another.
Using The Organizer™ is so natural you'll forget there's a computer behind it.
conceptual instruments company
4730 Warrington Avenue
Philadelphia, PA 19143
*trademark of Apple Computer, Inc.
**trademark of International Business Machine Corporation
CIRCLE 138 ON READER SERVICE CARD

creative computing software evaluation

Beware The Perilous Plums

David Lubar

creative computing
SOFTWARE PROFILE

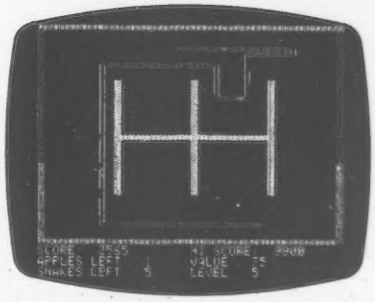
Name: Snake Byte
Type: Game
System: 48K Apple, Disk Drive
Format: Disk
Language: Machine Language
Summary: Interesting game for all ages.
Price: $29.95
Manufacturer:
Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827

Snakes and apples are a combination that goes a long way back. Throw in a couple of nasty plums, a collection of rooms, and a timer, and the result is a challenging game. At the start of *Snake Byte*, the player selects a game with one, two, or no perilous plums. These plums bounce around each room, and are deadly if they contact the head of the player's snake. This snake moves around the room, eating apples. Whenever an apple is eaten a new one appears. This continues until ten apples have been ingested. If the player takes too long, penalty apples appear.

When the player eats ten apples without being killed, he moves into the next room. Each room after the first contains some obstacle or obstacles. The second room contains a long horizontal line, the third has a cross, and the fourth a large set of lines in the shape of a capital E. Since the snake can't survive any collision, these obstacles increase the difficulty of each room.

While it might not seem too difficult to scoot around a room eating apples and ducking plums, there is one extra problem the player must face. When the snake enters a room, its body is fairly short. Each time the snake eats, it grows longer. By the tenth apple, the snake is much longer than the room. Only convolutions and other snakey actions can prevent a collision. And, though the plums lack intelligence and just bounce around the screen without aiming for the snake, they always seem to be somewhere near where you want to go. A beginner can survive longer by playing without plums, but someone who has begun to master the game will want to try his luck and skill against one or two plums. While a game with no plums is easier than a fruitful game, the presence of plums adds bonus points, thus allowing a higher score.

The game uses the keyboard for control,



with one set of keys for up, down, left, and right, and a second for clockwise and counterclockwise movement. Though the program defaults to the standard I,J,K,M sequence, this can be changed by the user. The game responds quickly to the keys, which is especially important when making a tight turn or going after an apple on the edge of a room. After a while, players will probably develop certain strategies, such as using part of the body of the snake to corral the plums, or looping back and forth to decrease the area blocked by the snake. But even with strategy and reflexes, it will probably be quite a while before most players make their way through all the rooms. While *Snake Byte* doesn't offer massive waves of attacking aliens or flights through space, it is a fun and challenging game, both for young people and adults. □

creative computing software evaluation

Talking Games for the TRS-80

Owen Linzmayer

Until a few months ago, if you wanted to give your TRS-80 the gift of speech, you had to purchase an expensive voice synthesizer, but not any more. Two new games on the market produce voices through the cassette port, these are *Robot Attack*, an arcade game from Big Five, and *Forbidden Planet* adventure from Fantastic Software.

Robot Attack

The object of *Robot Attack* is simple: you are stranded on an alien space station and you must destroy as many robots as you can before they kill you. Escape is impossible and death inevitable.

At the beginning of the game you are in charge of four men; an extra man is awarded every 5,000 points. You maneuver the men, one at a time, through an infinite series of partitioned rooms. As you travel from room to room, enemy robots try to do you in, either by shooting or ramming your man. Your only defenses against these mechanical monsters are your laser gun and superior intelligence.

By pressing the four arrow keys in various combinations, you can make your man run in eight directions. Up and down movements are the slowest, left and right are somewhat faster and the diagonals are the quickest. Using diagonal movement is a handy way to dodge enemy fire and outrun the Fiendish Flagship which appears if you tarry in one room too long.

To shoot your laser pistol, just aim in any direction and press the space bar. Only three of your shots are allowed on the screen at a time. Any robot hit by a shot is instantly blasted into space trash, but alas, you cannot harm the Fiendish Flagship.

Your intellect is almost as powerful a weapon as your laser gun. The robots, after all, can only do what they have been programmed to do. After playing a few games, you learn some of their habits, and begin to be able to predict what they will do when you make a specific move. Using what you know, you can cause the robots to run into themselves, and the electrified walls, and even shoot other robots. It is possible to clear a roomful of enemies without firing a single shot!

If you manage to destroy everything in a room, you are awarded 10 bonus points for every robot that was in the room when you entered. Just because you have cleared a room, don't think for a moment it will stay that way. The master security computer has been programmed to re-stock each room after you leave it.

Have I forgotten anything? Let's see, oh yes, the voices. The voices are terrific! Robot Attack has crisp, understandable voices which add a new dimension to game playing.

The cassette version of *Robot Attack* has a vocabulary of about a dozen words, the disk version has three times as many. Incidentally, if you've ever wondered what Bill Hogue sounds like, it is his voice that talks to you throughout the game.

In conclusion, *Robot Attack* is an excellent TRS-80 adaptation of the popular arcade game. It is somewhat slower than other Big Five games, but stands strong among them.

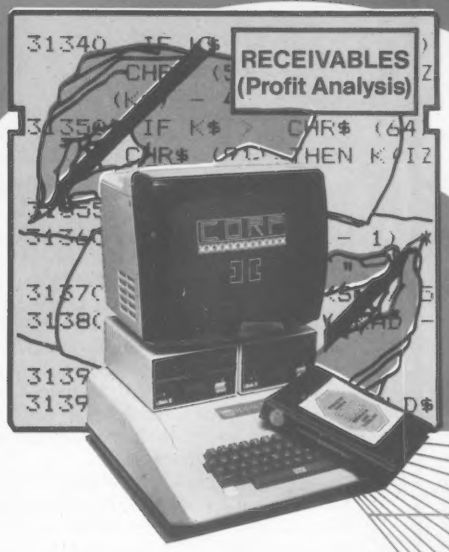
Forbidden Planet

You wake up in a plastic container aboard a malfunctioning star-cruiser. The ship's alert wails in the background, frantically you race around trying to find the right objects to repair the ship. Once you have fixed the cruiser you must crash-land it on a strange "forbidden planet"

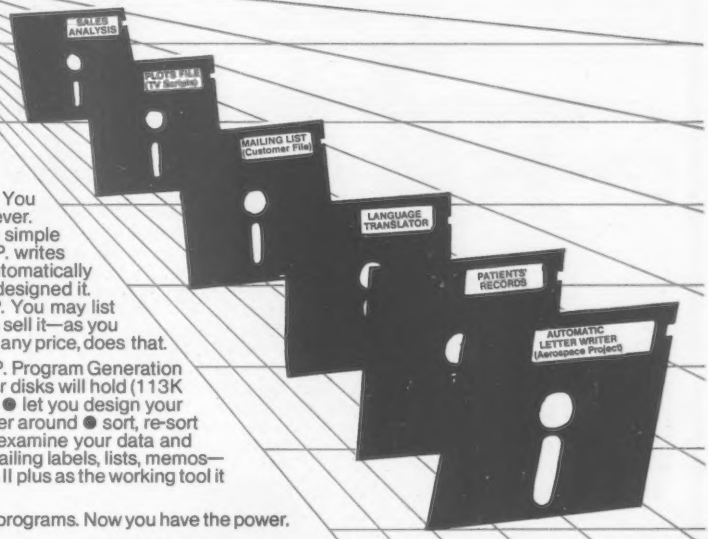
creative computing
SOFTWARE PROFILE

Name: Robot Attack
Type: Arcade game
System: TRS-80 Model I or III, 16K cassette, 32K disk
Format: Cassette or tape
Language: Machine
Summary: Excellent talking arcade game
Price: Cassette $15.95, disk $19.95
Manufacturer:
Big Five Software
P.O. Box 9078-185
Van Nuys, CA 91409

your power is ready...
software that writes software
for Apple II™



NEEDED: Apple II Plus with Auto Start, 2 drives, Applesoft in Rom, 48K.



C.O.R.P.™ writes software. Perhaps you should read that again. Not "simplifies programming" or "makes debugging easier." C.O.R.P. writes APPLESOFT BASIC—complete, stand-alone programs which run, bug-free, the very first time. You need not type a single character of basic code—ever. C.O.R.P. does that. Your answers to questions in simple English "design" the program. In minutes, C.O.R.P. writes all the program code, scrolls it to the screen and automatically saves it to your disk. Your program because you designed it. Once written, your program runs without C.O.R.P. You may list your program, examine it, modify it further or even sell it—as you wish, royalty free. No mere "data base manager," at any price, does that.

The applications are almost limitless. Your C.O.R.P. Program Generation System will: ● handle nearly as much data as your disks will hold (113K per disk!) ● find any record in less than a second ● let you design your own screens as quickly as you can move the curser around ● sort, re-sort and update your data for you ● examine and re-examine your data and then print reports, checks, invoices, statements, mailing labels, lists, memos—you name it. C.O.R.P. allows you to use your Apple II plus as the working tool it really is. Isn't that why you bought one?

Computers should write code. You should design programs. Now you have the power.

C.O.R.P. I features: ● a data entry program generator ● a full sort sub-system ● an update sub-system ● a full diagnostic package ● a print program generator $235

C.O.R.P. II features: ● all of C.O.R.P. I plus: ● a system menu generator ● a complete forms letter generator ● a full files editor ● a system demo package ● an Applesoft tutorial . . . . . $425.

CORTECHS
CORPORATION

900 North Franklin, Chicago, Illinois 60610

See your dealer today or call toll-free 1-800-621-4109

(In Illinois, call (312) 943-0700)

Dealer inquiries welcome.

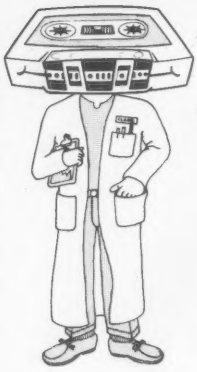
C.O.R.P.™

C.O.D. welcome.

C.O.R.P. is a trademark of Maromaty Scotto Software Corporation.

CIRCLE 141 ON READER SERVICE CARD

Sick of the same TRS-80 software?



Here's a CHEAP CURE!

The prescription for the **Model I and III:**
CLOAD Magazine!

A CASSETTE TAPE with 6 to 8 programs **a month!**

Some past sensational medications:

Game — Caterpillar, Suns, CIA Adventure, Reversi.
Practical — Securities, Energy, Tape Directory, Checkbook.
Utility — Variable Dump, Display, Edit, Code 4.
Tutorial — Planets, Spell Egg, Atomic Table, Geometry.

At about **75 cents** a program, a subscription to **CLOAD Magazine** is just what the doctor ordered.

The Bottom Line:

1 year (12 issues)	$50.00
6 months (6 issues)	$30.00
Single copies	
Back issues	$ 6.00
Good Games #1	$12.00
Adventures #1	$13.00

The Fine Print
All issues from Oct '78 on available — ask for list (24 Level I issues also). Programs are for 16K Level II, 16K Model III, and occasionally for disks. **TRS-80** is a trademark of Tandy Corp.

MasterCard/Visa welcome!

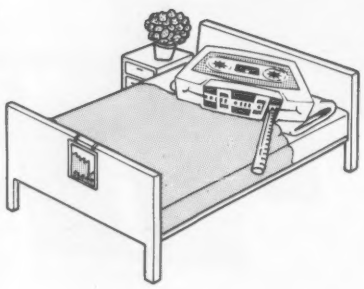
California residents add 6% to single copies
North America — First Class Postage Included
Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

CLOAD Magazine Inc.
P.O. Box 1448, Santa Barbara, CA 93102 (805) 962-6271

CIRCLE 120 ON READER SERVICE CARD

For the Extended BASIC COLOR COMPUTER

POCKETBOOK SURGERY NOT REQUIRED



Is your CoCo table-ridden, drinking up electrical juice but not getting any software solids? A prescription of **CHROMASETTE** Magazine will stop the hardening of the ribbon cables.

The doctor explained that **CHROMASETTE** Magazine is a cassette tape with 6 to 8 quality programs on it. A healthy mixture of games, tutorials, utilities, and practical programs to nurture your computer every month. No finger exercises necessary. Just load and run.

Keep CoCo's health costs low. A subscription to **CHROMASETTE** Magazine is good, cheap medication (under 75 cents a program).

The Bottom Line:

1 year (12 issues)	$45.00
6 months (6 issues)	$25.00
Single copies	$ 5.00

Calif. residents add 6% to single copies.
North America — First Class Postage Included.
Overseas — add $10 to subscriptions, and $1 to single copies. Sent AO rate.

MasterCard/Visa welcome!

The Fine Print:
All issues from July 81 on available — ask for list. Programs are for the Extended BASIC model only.

MasterCard/Visa welcome!

Chromasette Magazine
P.O. Box 1087 Santa Barbara, CA 93102 (805) 963-1066

CIRCLE 259 ON READER SERVICE CARD

creative computing
SOFTWARE PROFILE

Name: Forbidden Planet
Type: Text Adventure
System: TRS-80 Model I or III, 48K
Format: Disk only
Language: Machine
Summary: Talking adventure
Price: $39.95
Manufacturer:
Fantastic Software
P.O. Box 27734
Las Vegas, Nevada 89127

filled with angry ogres, caves, modern cities, radioactive lakes and much more.

This is the scenario for the first talking TRS-80 adventure, *Forbidden Planet*.

Forbidden Planet is a machine language program written by William Demas, the co-author of Scott Adams' Adventure #12, and is sold by Fantastic Software. Adams' style is evident throughout the program, from the split screen to the immediate response time. If I didn't know better I would have sworn that *Forbidden Planet* was Adams Adventure #13.

The program is a text-oriented adventure; you input commands in a verb/noun format, try to unlock mysteries, find treasures, fight battles and survive to enjoy it all. *Forbidden Planet* is exciting, sometimes frustrating, fast moving, challenging and just plain fun. It boasts a vocabulary of over 140 words plus 50 or so spoken words.

Don't be misled into thinking you are "talked along" the adventure. Only key phrases or clues are spoken, therefore if the computer talks, you had better listen carefully to what it says.

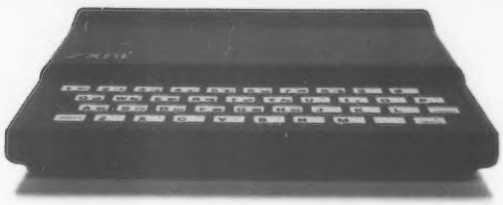
If you want, you can toggle the voice on or off in the middle of a game. The voice in *Forbidden Planet* isn't a drab monotone robot voice, but rather, a lively emotional human voice. The voice quality is good but slightly harsher than that of *Robot Attack*. Even so, every word is audible and comprehensible.

The space setting used in this program isn't novel, but Demas has added many original twists to the adventure. Even experienced adventurers will find *Forbidden Planet* very difficult to solve.

There is a variety of ways to die in the first 20 or so locations, and, needless to say, survival is tough. Anyone who enjoys a challenging adventure will find this program a delightful array of puzzles and obstacles waiting to be solved and overcome.

Forbidden Planet is a handsome addition to any collection of computer adventures and is worth the $39.95 price. □

Finally you can afford to satisfy your lust for power.



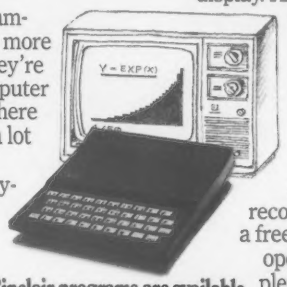
ZX81
EDIT 1
AND 2
THEN 3
TO 4
5
6
7
8
GRAPHICS 9
DELETE 0
PLOT DRAW REM RUN RAND RETURN IF INPUT POKE PRINT
Q " SIN
W OR COS
E STEP TAN
R <= INT
T <> RND
Y >= STR$
U $ CHR$
I (CODE
O) PEEK
P " TAB
NEW SAVE DIM FOR GOTO GOSUB LOAD LIST LET
A STOP ARCSIN
S LPRINT ARCCOS
D SLOW ARCTAN
F FAST SGN
G LLIST ABS
H ** SQR
J - VAL
K + LEN
L = USR
FUNCTION
ENTER
COPY CLEAR CONT CLS SCROLL NEXT PAUSE BREAK
SHIFT
Z : LN
X ; EXP
C ? AT
V /
B * IN KEY$
N < NOT
M > PI
. ,
£
SPACE

For $99.95 you can have a full powered personal computer.

Most people know by now that the ZX81 from Sinclair Research is the lowest priced personal computer in the world.

But serious programmers are looking for more than a low price. They're looking for true computer power. And that's where the ZX81 surprises a lot of people.

Just look at the keyboard and you'll get some idea of the ZX81 's power. It has more than 60 BASIC commands, 20 graphic symbols, and complete mathematical functions. And there's even more power that you can't see.

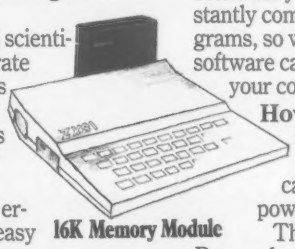


Sinclair programs are available

A breakthrough in personal computers. The ZX81 offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K
- A comprehensive programming guide and operating manual


16K Memory Module

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

What you get. When you order your ZX81, you get everything you need to start programming.

It comes with connectors for your TV and cassette recorder, an AC adaptor, and a free programming guide and operating manual that completely documents the capabilities of the ZX81.

Options and add-ons. Like any full-powered computer, the ZX81 can be expanded and upgraded.

Its 1K memory can be expanded to over 16K just by plugging the Sinclair Memory Module onto the back of the unit. The cost is only $49.95.

Sinclair has also published pre-recorded programs on cassettes for your ZX81. We're constantly coming out with new programs, so we'll send you our latest software catalog when you order your computer.

How did we do it? The question most often asked about the ZX81 is, "How can so much computer power cost so little money?"

The answer is that Sinclair Research simply took a different approach. Our only goal was to make programming power as affordable as possible. So we developed a radical new design that cuts costs dramatically without cutting computer power. For example, our unique Master Chip replaces as many as 18 chips used in other personal computers.

The success of the ZX81 speaks for itself. It is now the fastest-selling personal computer in the world. And we stand behind our product. If anything goes wrong in the first 90 days, we'll repair or replace your unit free of charge. Even after that, you can take advantage of our national service-by-mail facilities for a minimum fee.

Order now and try it out for 10 days. Simply send the coupon along with a check or money order. For faster delivery, call our toll-free number and use your MasterCard or VISA.

You have 10 days to try out the ZX81. If it isn't all we say it is, just send it back and we'll refund your money.

Why wait any longer? With the Sinclair ZX81, you can finally afford to have the computer power you've always wanted.

Call toll free 800-543-3000. Ask for operator #509. In Ohio call: 800-582-1364; in Canada call: 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

Free guide to programming

These numbers are for orders only. If you just want information, please write: Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

To order call toll free: 800-543-3000.

AD CODE 07CC

MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

	PRICE*	QTY.	AMOUNT
ZX81	$99.95		
16K Memory Module	$49.95		
Shipping and Handling	$4.95		$4.95
*U.S. dollars		TOTAL	

Name

Address

City State Zip

Sinclair technology is also available in Timex/Sinclair computers under a license from Sinclair Research Ltd.

sinclair

Screen Director

Screen Director™ retrieves and displays any standard image file on your Apple's video monitor, large screen TV or color printer. For only $150, Screen Director™ gives you a filmmaker's finesse in boardroom presentations, management briefings and demonstrations for clients.

With Screen Director™ you can scroll forwards and backwards through any color displays, with dissolves or cuts from one image to the next — all at the touch of two buttons. You can even enhance your **Apple Business Graphics** with title slides in a variety of fonts and colors.

Spice your Apple with cinema.

Screen Director™ includes both the two-button controller and all necessary software.

For information on dealers of Screen Director™ in your area, call (617) 491-3377.

Business & Professional Software, Inc.
143 Binney Street
Cambridge, MA 02142

Screen Director™ is a product of Business & Professional Software, Inc., creators of **Apple Business Graphics.**
Apple is a trademark of Apple Computer, Inc.

CIRCLE 116 ON READER SERVICE CARD

creative computing software evaluation

Blowing Up the Screen

Dale Archibald

creative computing

SOFTWARE PROFILE

Name: Zoom Grafix

Type: Graphics printer

System: Apple II or II Plus, Applesoft in ROM, 48K; Atari 800 in works

Format: DOS 3.3

Language: Machine and Applesoft

Summary: Simple, fast graphics with enlargement feature

Price: $39.95, $10 for a backup.

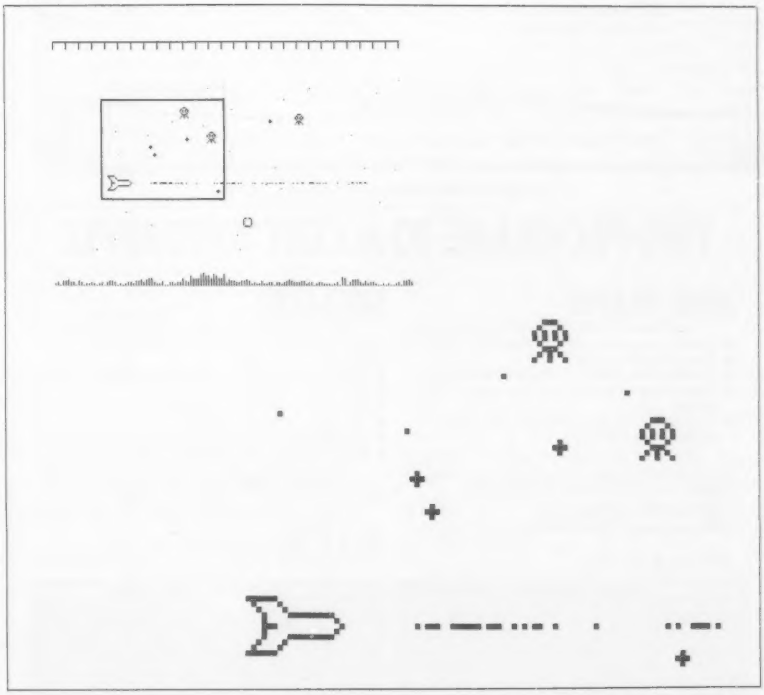
Manufacturer:
Phoenix Software, Inc.
64 Lake Zurich Dr.
Lake Zurich, IL 60047

Graphics printing programs come in handy for reviewers who need to illustrate articles with screen photos. Some programs allow you to hit reset in mid-move, and store an image in memory. With a graphics program, you can then print that image out as an illustration.

Programmers use graphics programs to see how their graphics look onscreen, or to send printouts with press releases. Businesspeople use them to make hard copies of charts and graphics.

Zoom Grafix by Dave Holle takes you a step past simply copying the screen image. It allows you to select any part of the image and blow it up. For example, if you were to freeze *Torax* (Figure 1), you could print out an image of just one of the attacking monsters rather than the entire screenful.

Figure 1.



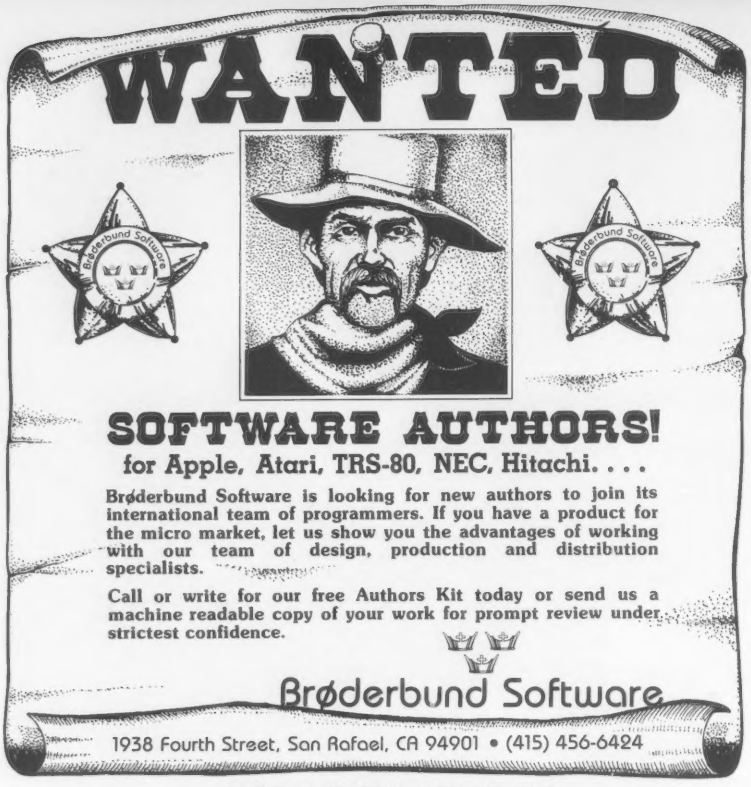
If you wanted to print the ghoulie normal size, you would select SIZE: 1 HIGH x 1 WIDE. Four times normal would be SIZE: 4 HIGH x 4 WIDE. You could make it wider than normal or higher than normal just by using 2 x 4 dots, or 4 x 4 dots.

Using *Zoom Grafix*, you can drive any of several graphics printers. With some, however, if you want to print wider than the paper, you lose the right side as the program compensates.

You can expand a graphic several sizes with *Zoom Grafix*. You simply print out one section at a time, then glue all the printouts together. For business, you could expand a graph or chart to use at meetings.

But the zoom feature isn't the only good thing about the program. It also shows you what the graphic is in its memory. It will print either hi-res screen 1 or 2. It will print white on black or black on white. It has a blinking "window" that lets you frame—and see—the exact area to be printed on your graphic; and you can change the area if your previous selection doesn't suit you.

Dale Archibald, 1817 Third Ave. N., Minneapolis, MN 55405.


WANTED
Brøderbund Software
Brøderbund Software
SOFTWARE AUTHORS!
for Apple, Atari, TRS-80, NEC, Hitachi. . . .
Brøderbund Software is looking for new authors to join its international team of programmers. If you have a product for the micro market, let us show you the advantages of working with our team of design, production and distribution specialists.
Call or write for our free Authors Kit today or send us a machine readable copy of your work for prompt review under strictest confidence.
Brøderbund Software
1938 Fourth Street, San Rafael, CA 94901 • (415) 456-6424

CIRCLE 114 ON READER SERVICE CARD

TWO PROGRAMS TO ACCENT YOUR APPLE

ACCU-SHAPES

The One-of-a-Kind, Ultimate Shape Builder

- Create shapes in lo-res with magnified detail
- View them in hi-res and color
- Transfer them back to lo-res for further editing
- "Page" through a table as if thumbing through a book
- Add, delete, combine shapes from several tables to form new tables

For the advanced programmer or the beginner, to design a library of character sets, special graphic symbols and shapes for animation.

Fast Assembly Language, 48k
ROM Applesoft, DOS 3.3 **$49.95**

SOFT-STEP

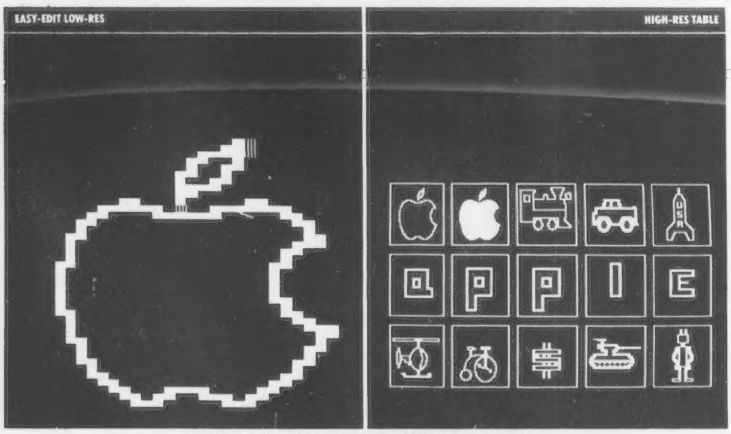
The easy-to-use debugger for your Applesoft BASIC programs. Helps experts find bugs and beginners learn BASIC.

- Single-step through your BASIC program
- Set breakpoint at any line
- List the next line to be executed
- Trace all or only chosen lines
- Examine values of variables & memory
- Define values of variables & memory

All of this and more, without modifying your source code! Uses only 2.8k. Requires 32k, DOS 3.3 Fast Assembly Language **$49.95**

See your dealer today

ACCENT software
3750 Wright Place Palo Alto, CA. 94306 (415) 856-6505



CIRCLE 103 ON READER SERVICE CARD

Zoom Grafix, continued...

Printers

Once you have selected your printer and interface, you can store it on disk *after* you have tested your configuration. (Configurations can be changed at any time for different printers.)

The printers that are on the menu to operate with *Zoom Grafix* are the Anadex 9000, 9001, 9500 and 9501; Diablo; Epson MX-70, 80, and 100; IDS 225, 440, 445, 460 and 560; MPI 88G; NEC PC-8023; Prowriter; Qume Silentype; Spinwriter; Starwriter; and Xerox. Phoenix promises it will accommodate others in the future with optional updates.

Interfaces on the menu include the Apple Centronics, parallel, serial, and Apple III RS-232; Centronics CCS 7710, 7720 and 7728; Epson APL; Grappler; IS EP-12 PKASO; K-T; MC CPS parallel and serial; MPI Auto-Plot; SSM AIO parallel and serial; Tymac; and Versacard parallel and serial.

It is a very thoughtful program, with good error-trapping. It is, however, a bit slow to load. This, it seems, is because it takes up all but about 1K of memory in the Apple. Once it has loaded, it seems to operate very rapidly.

It is a very thoughtful program with good error-trapping.

When booted, if your printer isn't turned on, the program is supposed to stop with WAITING FOR THE PRINTER signalling the reason. It didn't on the version I tested (an early one). Instead, it goes through the sequence and all the questions, then hangs up when it should begin printing. That just means turning my MPI-88G on and tapping the paper advance switch to get it chugging.

There are other parts of the menu for printing in addition to positive or negative selection, size of zoom, and horizontal or vertical printing.

Zoom Grafix also lets you set: the zoom window from 0,0 to 279, 191; left margin; print width (automatically set for the machine you use, but you change this if you are using narrower paper); delay to set the time the printer should rest after each row, so it doesn't overheat; printer change; and line- or formfeed.

It is a simple, mostly self-explanatory program. Questions are answered in the 10-page instruction book. Non-bootable disks will be replaced free for the first 90 days after purchase, then for $5 after that with the return of the original. □

creative computing software evaluation

Awaken the Artist in Your Apple

Ame Choate Flynn

creative computing
SOFTWARE PROFILE

Name: Special Effects

Type: Apple Graphics

System: 48K Apple II, joystick, paddle or graphics tablet

Format: DOS 3.3

Language: Applesoft and Machine Language

Summary: Highly recommended

Price: $39.95 joystick or paddle, $69.95 graphics tablet

Manufacturer:
Penguin Software
830 4th Ave.
Geneva, IL 60134

Apple Graphics have come a long way in the past year. The resolution hasn't changed, neither have the ubiquitous six basic colors; but graphics software utilities have enabled the Apple to approach state-of-the-art computer graphics.

Large expensive computer graphics systems allow for creation of real-time, on-the-spot art and animation. They usually have unlimited color capability and let you draw directly without pre-planning your x and y coordinates. You can choose from a selection of "brushes"—a specific one for every type of line—load the brush with color and have it reproduced on the screen.

With *Special Effects* by Mark Pelczarski the Apple computer comes very close to emulating main-frame computer graphics systems costing as much as $250,000 for only $39.95.

Ame Choate Flynn, TechniGraphics, 111 Hicks St. #17B, Brooklyn Heights, NY 11201.

The utility can be divided into three basic parts: creating a picture, modifying one you already have, and animating and working with it in either an immediate mode or within your own programs.

Creating A Picture

The "Brush" or "Paint" module gives you a choice of 96 brushes or shape tables that take the place of your cursor. These shapes range from the smallest dot to lines to an air-brush splatter effect.

You can load the brush with any one of 107 colors or color patterns and move the brush/cursor around the screen with the paddles.

You can stand back from your work and make it do things you never believed possible.

Unlike the more formalized coloring book type of picture creation, where you draw some lines and fill with color, *Special Effects* allows you to put color next to color with no need for a black or white border.

The irregularly shaped air brushes allow for highly sophisticated shading and modeling. As an artist, this aspect of the utility gives me the freedom that I have come to expect with oils or acrylics, but not with my computer.

Mr. Pelczarski has made it very easy to move around the module; brushes and the color palette are displayed on page two so you can move back and forth easily from the select mode to your painting on page 1. He has even included a "Magnifying Mode" which lets you magnify the area around the cursor two or four times and turn individual pixels on or off to make them black or white.

Modifying A Picture

Using the "Conversion Module," you can take a picture you have created using other software or with a graphics tablet, and convert it into the *Special Effects* format; or conversely, take a *Special Effects* picture, convert it, and use it with the tablet.

In this module there is also a "Font Converter" which allows you to take fonts from *DOS Toolkit* or *Higher Text* and use them in the character generator in *The Complete Graphics System*. These are basic utilities which keep non-programmers from total frustration and having to remember if a picture is a Pic. TITLE (tablet) picture or a TITLE.Pic (*Special Effects* or *The Complete Graphics System*) picture.

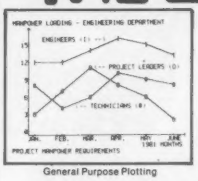
Simply having fun with a picture is sometimes difficult; you tend to take your "art" too seriously. With the "Graphics Tricks" module you can stand back from your work and make it do things you never believed possible, all with the press of one or two keys. "Picture Flips," for example, give you a mirror image of your graphic—left on right side, top on bottom, etc. The graphics you wind up with may look very different from what you started with, but I guarantee you will have a great time.

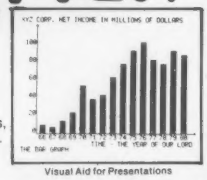
"Color Trick" changes selected colors to other colors. You are given a "negative image" or mirror image of the picture with the colors changed. These tricks and flips are easy to get in and out of, and I

THE SUPERPLOTTER©

version 2.2

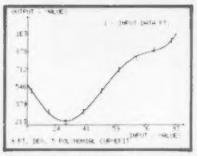
For use with Apple™ Computer Systems

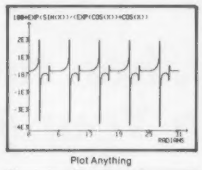

General Purpose Plotting


Visual Aid for Presentations

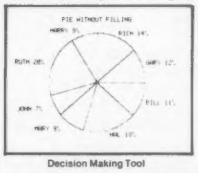
The Superplotter is a highly versatile business, engineering, educational, math and graphics applications package featuring:

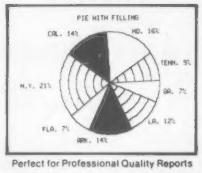
Standard Bar Graphs•Point and Line Graphs• Graphics Display of any Mathematical Function• Least Squares Polynomial Curvefit Generation• Keyboard Image Shape Tables and User Tutorial•Automatic Graphics Disk Storage and Recall•Data File Editor•Automatic Disk Storage and Recall of Editor Data Files•Overlay Modes•Graphics Screen Text Editor


Statistical Data Analysis Forecasting Tool


Plot Anything

Data may be input directly or from previously generated data files. Comprehensive documentation is provided including printer dump instructions and directions for accessing data bases created by other programs. Requires Applesoft and one DOS 3.3 disk drive.


Decision Making Tool


Perfect for Professional Quality Reports

$69.95

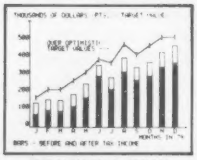
See your local dealer for a demonstration or order direct from:

Dickens Data Systems

478 Engle Dr. / Tucker, Ga. 30084 / (404) 491-7905

outside Georgia: (800) 241-6753 ext. 503

C.O.D., VISA, & MasterCard accepted.
Mail Orders: Add $2.50 for shipping and handling ($5.00 outside the USA)


Extensive Overlay Capabilities

Plot Keyboard Characters on Any Graphics Display Simply

CIRCLE 150 ON READER SERVICE CARD

SOMEDAY . . . in the comfort of your own home or office, you'll be able to shop and bank electronically, read instantly updated major newswires, analyze the performance of a stock that interests you, send electronic mail to business associates across the country, then play Bridge with your best friend in San Francisco and two strangers in Chicago and Dallas.

WELCOME TO SOMEDAY

Someday is today with the CompuServe Information Service. All this and more can be accessed with a local phone call in most major U.S. cities. For hardware you need a terminal or personal computer and a modem. The CompuServe Information Service costs only $5.00 per hour, billed in minute increments to your charge card.

Ask for a demonstration at a Radio Shack® Computer Center. Videotex software is available for various brands of personal computers. CompuServe Information Service, 5000 Arlington Centre Blvd., Columbus, Ohio 43220. (614) 457-8650.

CompuServe

CIRCLE 123 ON READER SERVICE CARD

Special Effects, continued...

could have used them at the Rhode Island School of Design when my 2-D teacher said "Do it again—different."

Animation

The last options in this module are to move or animate your pictures. You can take a rectangular portion of the picture and move it to any portion of the picture on page one. You can move parts of pictures from page two to page one at different times giving you quite sophisticated animation. You use the paddles to define the portion of the picture you wish to move, and scroll it onto the page in an up or downward direction.

"Programmers Notes" tell how to use this option in your own programs and move parts and pieces in and out of the screen easily and effectively. I used it in a demonstration disk recently and it stopped the show.

Another way of moving a picture onto page one or through a picture on page one is to spiral it with a delightful routine that starts in the middle of the screen, and "spirals out" your picture from page two.

The "Packing Module" eliminates the old limitation of only 13 or so 34-sector pictures on a disk. Using a look-ahead table, you can squeeze down most pictures to a length of only 7 to 20 sectors depending on their complexity.

With this module you can pack a picture, unpack a picture or create a string of packed pictures. You can string from three to ten pictures together, and load them into HIMEM.

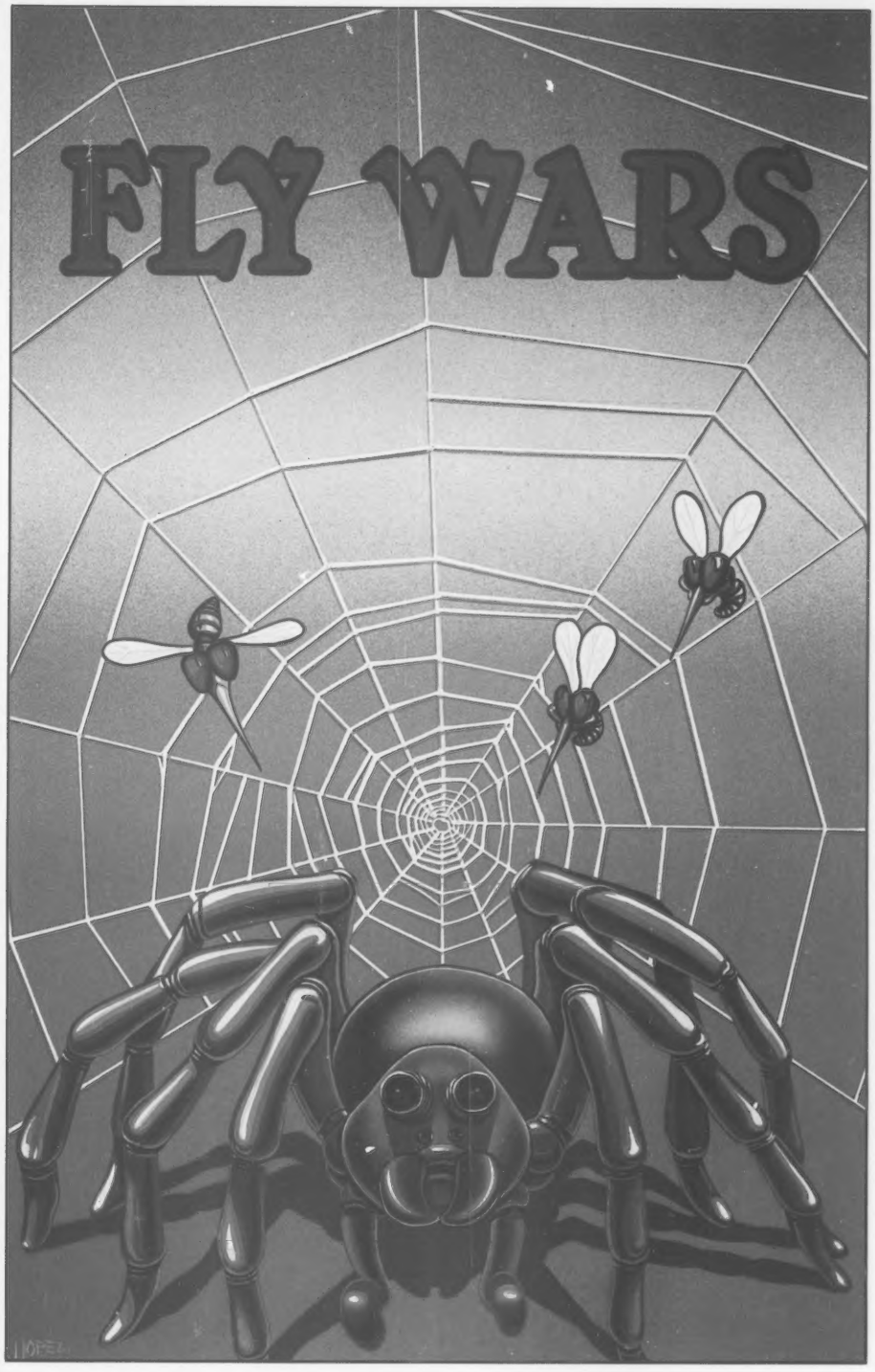
With the "Viewstring" module, a short program, you have quick (less than 15 seconds) access to all pictures in the string. They are all stored on page two, and you just call them out when you want them. I have used this for animation by modifying each picture in the string slightly and playing them out at two or three second intervals.

Documentation

The *Special Effects* disk is copy-protected, but you can use the pictures and subroutines created with it in your own programs. Mark Pelczarski has even listed the addresses and lengths of the subroutines so you can put them on your own disk, and his well-written documentation makes them easy to use.

Good documentation is a major part of any piece of software, and using the well-designed booklet is a delight. Each module is fully described with the options that are available to the user, and there is even a short reference guide in case you forget what a particular command means.

I highly recommend *Special Effects* to anyone who wants to take advantage of the Apple color graphics capabilities, and have fun at the same time. □



Long long ago, in a garage far, far away, a brave alliance of Spider-Fighters were at war with the tyrannical Raygunites. Regenerating Fly-Fighters, Black-hearted Beetles, or a quick shot of B.S. (bug spray) sent many a Spider-Fighter to bug heaven. Fly back in time with us as the last surviving Spider fearlessly spins his web of purple energy in a valiant effort to keep the flame of freedom aglow . . .

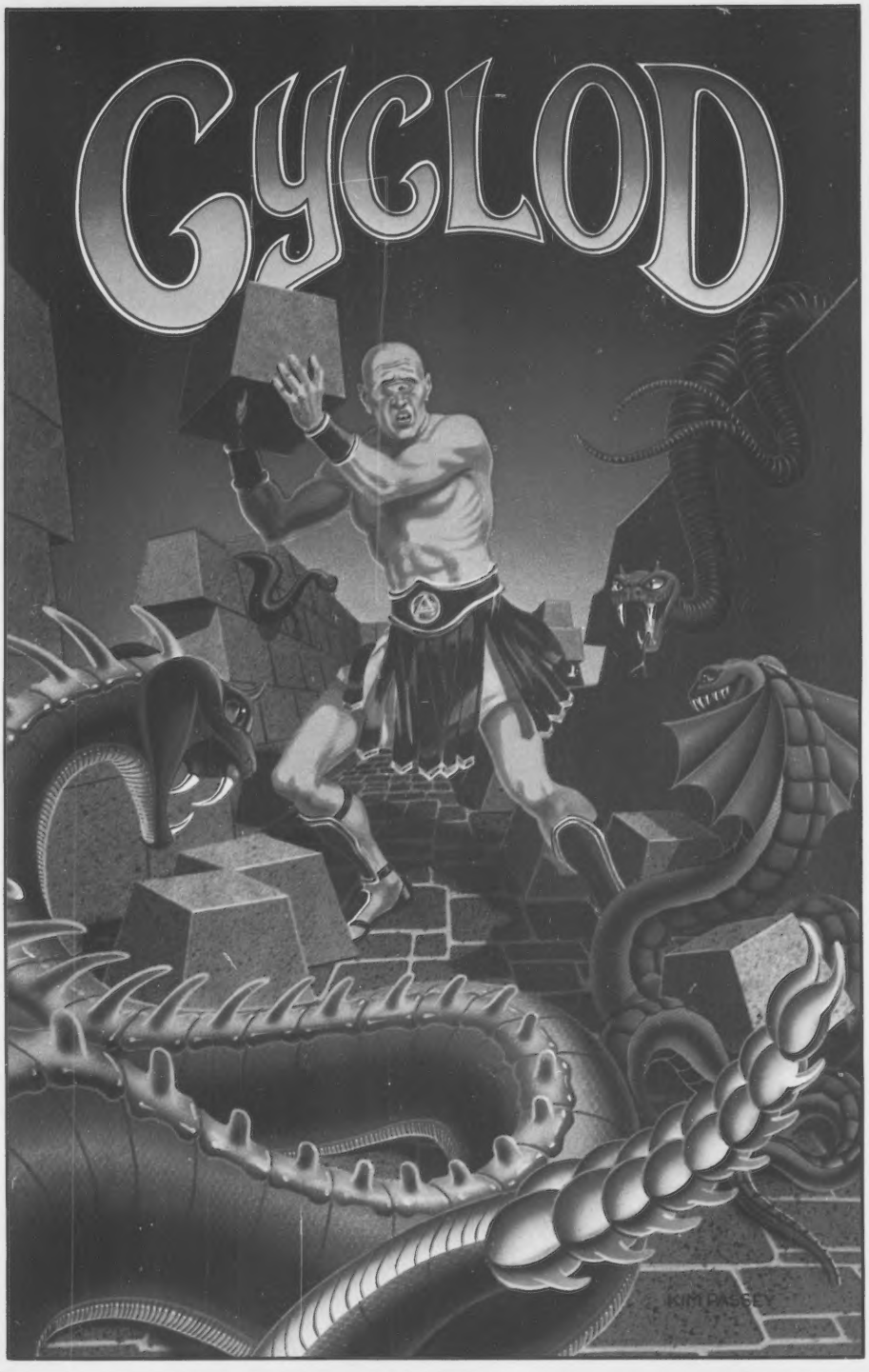
Fly Wars requires a 48K Apple II or II+ computer with one Apple disk drive and is playable with keyboard or Sirius' Joyport and Atari-type joystick.

Fly Wars, copyright © 1982 by Sirius Software, Inc. Sirius and Joyport are trademarks of Sirius Software, Inc. Apple II is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. Sirius Software, Inc. is not affiliated with Atari Inc.

Sirius Software, Inc.
Sacramento, California
(916) 366-1195

Boredom Repellent.

CIRCLE 235 ON READER SERVICE CARD



What's a Cyclod????
Cy•clod (sī'kläd) n., pl. cyclods [Gr. < cy, one-eyed and clod, stumble bum] 1. in Ophidian legend, the name of three bug-eyed brick fighters known as Mascara, Glaucoma, and Cornea; 2. In Myopian legend, a cross between a clumsy mason and a one-eyed snake charmer; 3. in Sirius legend, the video representation of a game wherein an eyeball fights snakes with bricks.

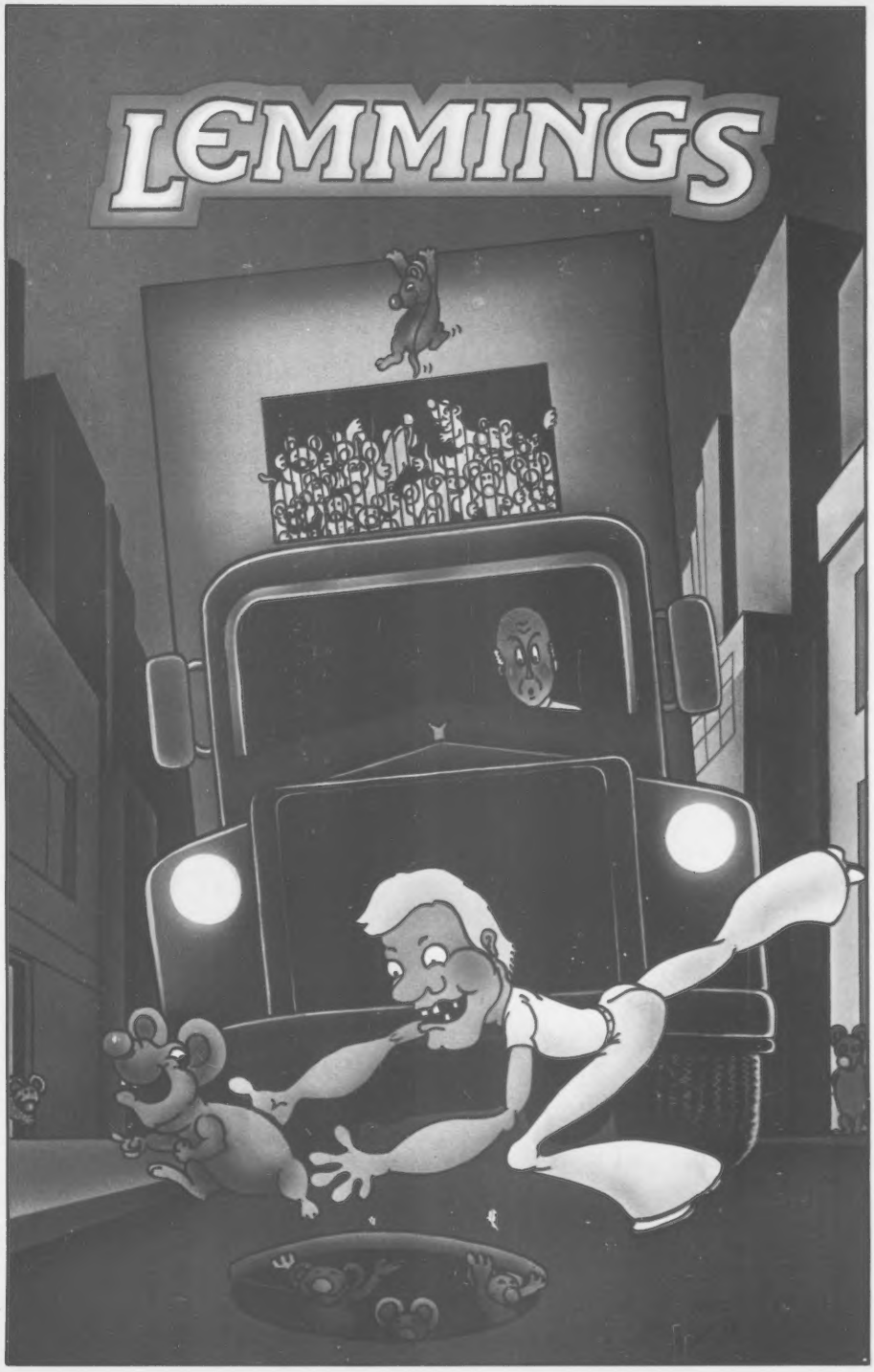
The craziest game yet from the masters of crazies at Sirius. Cyclod requires a 48K Apple II or II+ with one Apple disk drive and is playable with keyboard, Apple-compatible joystick, or Sirius' Joyport and Atari-type joystick.

Cyclod, copyright © 1981 by Sirius Software, Inc. Sirius and Joyport are trademarks of Sirius Software, Inc. Apple II is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. Sirius Software, Inc. is not affiliated with Atari Inc.

Sirius Software, Inc.
Sacramento, California

CY•CLOD (SĪ'KLÄD)

CIRCLE 235 ON READER SERVICE CARD



Forget the whales, save the Lemmings! These fuzzy little rodents are in need of some population control. Getting them to mate without over-breeding is enough to drive you crazy. Keeping 'em safely locked up is even worse. You see, you gotta keep the Lemmings from getting hit by trucks or going on a mass suicide jump into the sea. It's not easy! Lemmings — they're everywhere! AAYYYAaaaa!

Lemmings, a new game of wits and action for the committed game player. Lemmings requires a 48K Apple II or II+ computer with an Apple disk drive and is playable with keyboard, Apple-compatible joystick or paddles, or with Sirius' Joyport and Atari-type joystick.

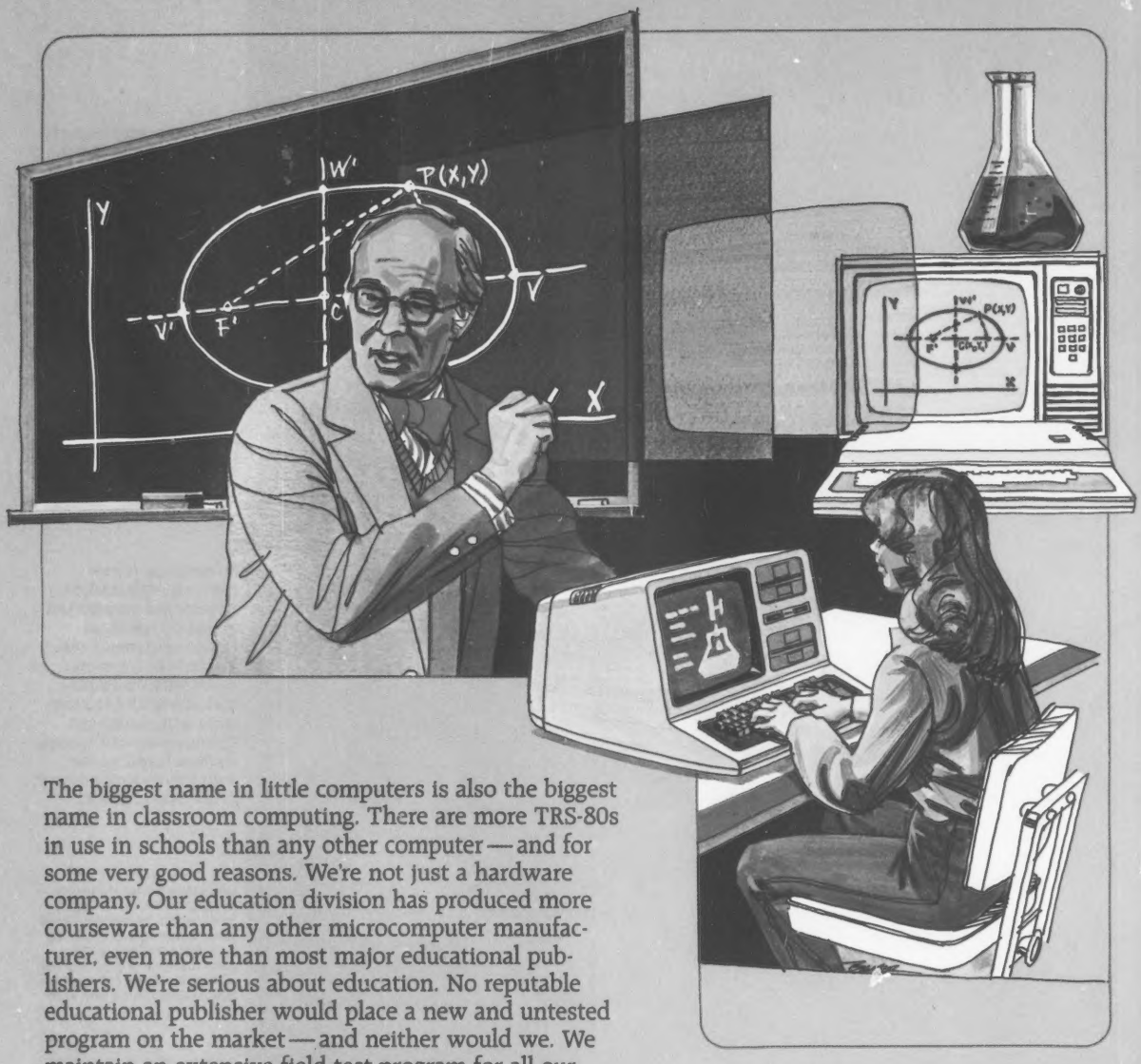
Lemmings, copyright © 1981 by Sirius Software, Inc. Sirius and Joyport are trademarks of Sirius Software, Inc. Apple II is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. Sirius Software, Inc. is not affiliated with Atari Inc.

Sirius Software, Inc.
Sacramento, California

Join The Mass Migration!

CIRCLE 235 ON READER SERVICE CARD

Reading, Writing, and TRS-80®



The biggest name in little computers is also the biggest name in classroom computing. There are more TRS-80s in use in schools than any other computer — and for some very good reasons. We're not just a hardware company. Our education division has produced more courseware than any other microcomputer manufacturer, even more than most major educational publishers. We're serious about education. No reputable educational publisher would place a new and untested program on the market — and neither would we. We maintain an extensive field test program for all our classroom products. If they don't measure up, we don't put our name and our reputation on them. And they don't make it into your classroom. Our service and support organizations are second to none. And they're company-owned and company-operated — nationwide. If you're serious about computers in your classroom, ask a school that owns a TRS-80. And then visit a Radio Shack Computer Center or one of our stores near you. Or call 817-390-3302 for the name of our full-time educational sales coordinator in your area.

Radio Shack®

The biggest name in little computers™

A DIVISION OF TANDY CORPORATION

CIRCLE 225 ON READER SERVICE CARD

creative computing software evaluation

Four High-Res Text Generators for the Apple

A Comparative Review

Andrew Berentes

An Introduction To Hi-Res Text Generators

The Apple computer brought high-resolution graphics within the reach of most computer owners. Soon after serious hi-res programming is begun, however, most programmers become frustrated by the fact that the Apple makes no provision for mixing text with high-resolution graphics. For many applications, this is a severe disadvantage, so it is not surprising that several solutions have appeared on the market.

It is now possible to purchase any of a dozen or so packages which will allow the mixing of hi-res graphics and text. One approach, used by ROM Plus from Mountain Computer involves the installation of a new piece of hardware. This is a useful, if somewhat expensive approach.

The other method, the one which this article will discuss, involves the use of a software-based high-resolution character generator.

The software approach has several advantages, when compared with hardware-based text generators. First, of course, is lower cost. One software-based character generator can be had almost for free, and even the most sophisticated cost well under $50. In my case, this permits me to own several different generators and to choose the best one for a particular application.

Andrew Berentes, Campus View House 405, Bloomington, IN 47401.

But there are other advantages of software generators. For example, once a program is written to use a particular generator, both the program and generator may be moved to another computer through use of a disk or tape.

With a hardware character generator, if you want to trade programs that use hardware generated hi-res text you are out of luck unless everyone owns the hardware.

Incidentally, all of the packages I will discuss include fully transportable lower case and do not require a lower case adapter.

Because software-based character generators are more numerous than the hardware-based types, the variety of special features is much greater. One of the generators I will discuss has especially powerful features for animation. Another allows the creation of large characters and the manipulation of the standard font in many effective ways.

When fonts — a font is any set of characters — reside in RAM instead of in ROM, they may be easily modified, and, in fact, entire fonts may be created with very little trouble. One of the packages discussed comes with 21 fonts ready to go. With a character set in ROM, changing the characters is more complicated and more expensive.

Using Hi-Res Generators

Hi-res character generators all operate in a similar way. They are designed so that normal PRINT commands will control the placement of characters on the hi-res page. Essentially, the hi-res generator hooks into the normal print machinery; when a particular character is printed on the text page the hi-res generator takes that as a cue to draw a predefined shape on the hi-resolution screen. Thus the generator gets its position cues from the cursor position and the instruction for which character to draw from the character that is printed on the text page.

But wait a minute. No one says that just because an A is printed on the text page, an A must be drawn on the hi-res page. In fact, hi-res generators allow the user to redefine characters so that, while normal letters are printed on the text page, the hi-res page may be getting Greek alphabetic characters.

This allows the creation of special symbols for special purposes. These symbols might include normally unavailable mathematical symbols, a Japanese syllabary, or the graphic symbols you need for your new Star Trek game.

So, one of the first things you should look for in a hi-res character generator is an easy way to design your own char-

acters. Fortunately, most packages include a program which allows the user to define characters in a grid and then stuff them back into the font.

This process is still time consuming, since every character has at least 56 points to be considered. Still, it is not all that difficult, and it is usually faster than defining shape tables to do the same job.

Another helpful feature in a hi-res generator is a command which disables normal screen scrolling. Because part of the screen is often taken up by graphics, we often want to use every available text line. A major frustration is that line 24 of the screen is difficult to use because the screen tends to scroll up following a print to that line.

The usual result of scroll defeat is that when a carriage return is issued in line 24 the cursor returns home without clearing the screen. The ability to disable screen scrolling is available in some form in three of the generators discussed in this article.

Animation in Hi-Res

Among the most sophisticated applications for hi-res generators is character animation. With this process, characters are defined such that, when printed in blocks, large shapes are drawn. These shapes may then be animated with PRINT statements. For those of us who do not choose to do animation in assembly language, these character animations can often be made to operate must faster than would be possible with shape tables. Certainly, the figures are easier to create.

The ultimate animation technique is nondestructive animation. With this technique it is possible to move a shape over a background object without erasing parts of that object. We owe this capability in the Apple to the fact that there are two hi-resolution screens.

The background is stored on the unseen page, called the secondary page. When the characters to be animated are printed, they are overlaid on that secondary page. The result is transferred to the primary page, which is the one seen by the viewer.

I have found advantages to each, and I use one or another as appropriate for my current purpose.

Thus, the background is stored on the secondary page, and can be reinstated on the primary page when the character has moved. While this may sound complicated, with one of the hi-res generators discussed, it is quite easily implemented. An excellent demonstration of this is RIBBIT, found in the DOS Tool Kit.

Related functions allow the generator to overlay characters. Thus it is possible to underline or to create composite characters fairly easily. This feature, used in a slightly different manner, allows the generator to print on a background, choosing either black or white as the print color to make the print visible.

The Hi-Res Character Generators

In working with these four character generators I have found advantages to each, and I use one or another as appropriate for my current purpose. So, my goal here is not to recommend one over the others, but to illuminate the features of each so that you can choose the one most appropriate to your applications.

As one further aid to choosing the best generator for you, note that all except *Screen Machine* include demonstration programs. These programs vary in complexity and serve to show the scope of hi-res generator applications in general as well as the features of any particular generator.

I would strongly recommend that you seek out each of these programs and view their demonstrations before making a final purchase. Another interesting illustration of hi-res text is "Apple Pie" by N. R. McBurney II *(Creative Computing,* August 1980).

You will notice that there are really two *High-Resolution Character Generators,* both from Apple. The latest, found in the DOS Tool Kit, is called *HRCG* in the manual. I have used that name to distinguish the new program from the original which was published in the Contributed Software Bank.

(Note: Very similar programs come with *Pascal Animation Package* and *Pilot Animation Package* from Apple. —Ed.)

Hi-Res Character Generator may usually be copied onto your disk at an Apple dealer. *HRCG* must be purchased along with several other programs in the DOS Tool Kit.

Screen Machine is available in a tape version which is fully compatible with DOS. It is manufactured by Softape and may be ordered directly from them. I have noticed that it is now being published on disk, but I have no experience with the disk version.

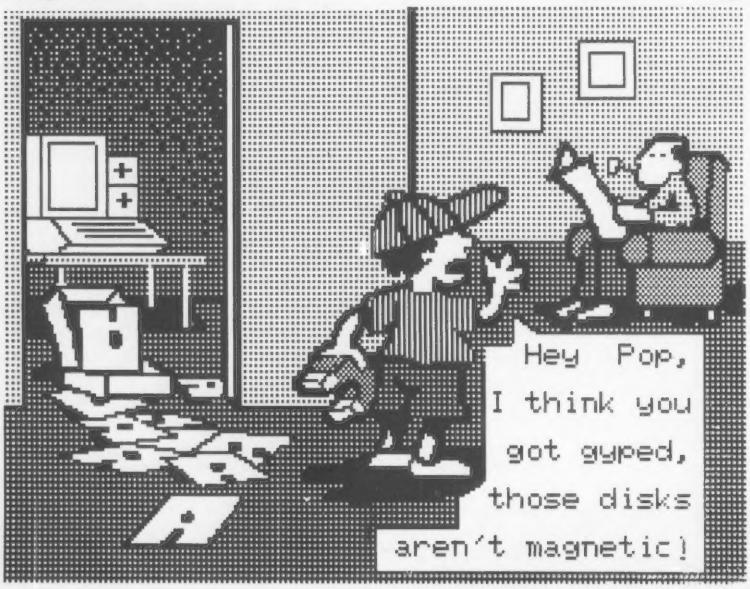
Higher Text is distributed nationally by Synergistic Software and is available also through the A.P.P.L.E. users group to members only. The version reviewed was obtained from A.P.P.L.E., and may differ from the version as distributed by Synergistic.

A Word of Warning

I should mention something here before moving on. The memory locations from $300 to $3FF (768 to 1023 decimal) are quite popular locations for small machine language programs, such as the standard Applesoft tone generator.

Be aware that they are commonly used by the character generators also. Memory maps are provided by *Higher Text* and by *Screen Machine,* detailing their $300 page usage; these should be consulted before you try to use this memory range.

Magnetic — **Robert Cavey**



Get Omni quality for as little as $1.99... even if all you want is a 10 pack.

Call toll-free for great savings on Omni's complete line of 5¼" premium disks. Each is certified error-free at a minimum of twice the error threshold of your system. Each is rated for more than 12 million passes without disk-related errors or significant wear. And each is precision fabricated to exceed all ANSI specifications with such standard features as reinforced hub rings and Tyvec sleeves. Get same day shipment and an unconditional, no hassle money-back guarantee.

ARCHIVE

23 Alvarado Ave.,Worcester, MA 01604
(800) 343-0314; In Mass:
(617) 756-2960

Call toll free (800) 343-0314 In Mass: (617) 756-2960

Call if you're not sure which disk is compatible with your system. Call for prices on 96 tpi and special formats. We offer an unconditional money-back warranty. We're here to help.

Be sure to indicate system name and model # at right.

# of 10 Packs	5¼" Disks	Price Per 10 Pack	Total Price
_____	Single side/single density	$19.90	$_____
_____	Single side/double density	$23.90	$_____
_____	Double side/double density	$39.90	$_____
_____	Flip/Floppy reversible Double side/double density	$39.90	$_____
_____	Protective plastic library case (in lieu of soft storage box)	$ 2.99	$_____
	Shipping and handling		$ 1.50
	5% sales tax (Mass. only)		$_____
		Total	$_____

☐ Check ☐ Master Card
☐ COD ☐ VISA

Card # _____ Exp. _____

System and model # _____

Name _____

Address _____

_____

Tel. _____

CIRCLE 199 ON READER SERVICE CARD

	Hi-Res Char. Generator	Screen Machine *	Higher Text	HRCG
Number of Characters in Font	128	96	96	96
Fonts Available Under Program Control	1 normally more are possible	1	3 or more depending on available memory	1 to 10
DOS Compatibility	3.2 or 3.3	3.2 or 3.3	3.2 or 3.3	3.3 only
Use with Cassette	Yes (moderately easy)	Yes (very easy)	No	No
Minimum Memory Required	1.25 K (1 font)	1.75 K (1 font)	6.1 K (3 fonts)	2 K (1 font)
Machine Memory Required	16 K	24 K	32 K (48 K preferred)	32 K
Location in Memory	Any available space	Above HIMEM (Applesoft)	Decimal 3072 to 8191	Above HIMEM
Method of Control	POKEs	POKEs and CALLs	POKEs, Control Characters	Control Characters
Non-Destructive Animation	No	Yes	Yes	Yes (very convenient)
Colored Text	No	No	Yes	No
Enlarged Text	No	No	Yes	No
Text Scroll Disable	Yes (No normal scroll)	Yes (Also normal scroll)	No	Yes (Also normal scroll)

*Cassette version

High-Resolution Character Generator

The original *High-Resolution Character Generator* has been available for some time. It is in Volume 3 of the Apple Software Bank Contributed Programs, which I obtained, along with the rest of Volume 3, for a copying charge. Even if you must pay more than I found necessary, however, you will get a bargain, since Volume 3 also contains such well-known programs as *File Cabinet, Apple Vision, Airfoil,* and *Internal Combustion Engine Simulation.*

creative computing
SOFTWARE PROFILE

Name: Hi-Res Character Generator (from Apple's Contributed Software, Volume 3)

Type: Graphics Utility

System: Apple II (or Apple II Plus), 16K, Disk or Cassette

Format: Disk or cassette

Language: Machine Language

Summary: Best buy. It works and it's almost free.

Price: Usually free, see text.

Manufacturer:
Apple Computer, Inc.
10260 Bandley Dr.
Cupertino, CA 94017

High-Res Character Generator is the most compact of the four generators considered in this article. It has two parts: a program, which requires 256 bytes of memory, and a character table, which uses 1K.

Further, these components may be located in almost any free area in memory. The combination of small size and relocatability makes *High-Res Character Generator* the only one of the four that can be used with a 16K system.

The documentation may be a little difficult to find. (My dealer doesn't normally have it.) I have, therefore, included a basic guide to the use of the package in this article.

You will notice that it uses POKEs to enter commands, but the required commands are relatively few in number. The serious user would be well advised to assign variables to 972, 973, and 974 so that, to turn on, say Inverse printing, you would do a POKE MODE, INVRS rather than POKE 973,255. This will make the user's job much easier.

Unlike the other packages, *High-Res Character Generator* has no command to enable lower case printing. Instead, this is accomplished within the context of the Basic program. To learn the procedures, list the Hi-Res Demo which is included with the generator.

The Demo is heavily documented and contains lines which may be lifted verbatim and used in your program. The algorithm is not difficult to understand and is well worth a few minutes of study.

It is possible, if a little inconvenient, to design your own character fonts. This is accomplished by plotting characters on a grid and translating the grid points into hexadecimal code.

The procedure is elaborate and time-consuming, but not terribly difficult if all the steps are followed carefully. Up to 256 characters may be put into memory without too much trouble; and more can be added with a little work.

If you wish to create characters, you will find instructions in the Contributed Programs, Volumes 3-5.

Hi-Res Character Generator is compact, inexpensive, and fulfills the most common requirements of a character generator quite well. It can be used easily with any memory size, with Integer Basic or Applesoft, and with cassette or disk-based systems. You may never need anything more elaborate than *Hi-Res Character Generator.*

Screen Machine

Screen Machine was my first hi-res text generator for a very good reason. It was and still is the only one I know of that is every bit as convenient when used with a cassette based system as when used with a disk drive.

Most hi-res programs require that a

DISCSAVERS

VINYL PROTECTIVE DISK SLEEVES

COLOR CODED: Multi-color DiscSavers™ are designed for easy recognition of individual disks with your own color-keyed filing system. Ideal for office or home use.

PROTECTIVE: Custom grain vinyl provides added protection for magnetic disks by guarding against common handling hazards.

ATTRACTIVE: DiscSavers provide a handsome and professional method of single disk storage and enhance the look of your hardware while protecting your valuable software.

DURABLE: Rigid vinyl construction protects against constant handling to ensure long wear and tear.

PORTABLE: DiscSavers are the only portable vinyl disk sleeves for use with a single diskette that bear the RockRoy mark of quality.

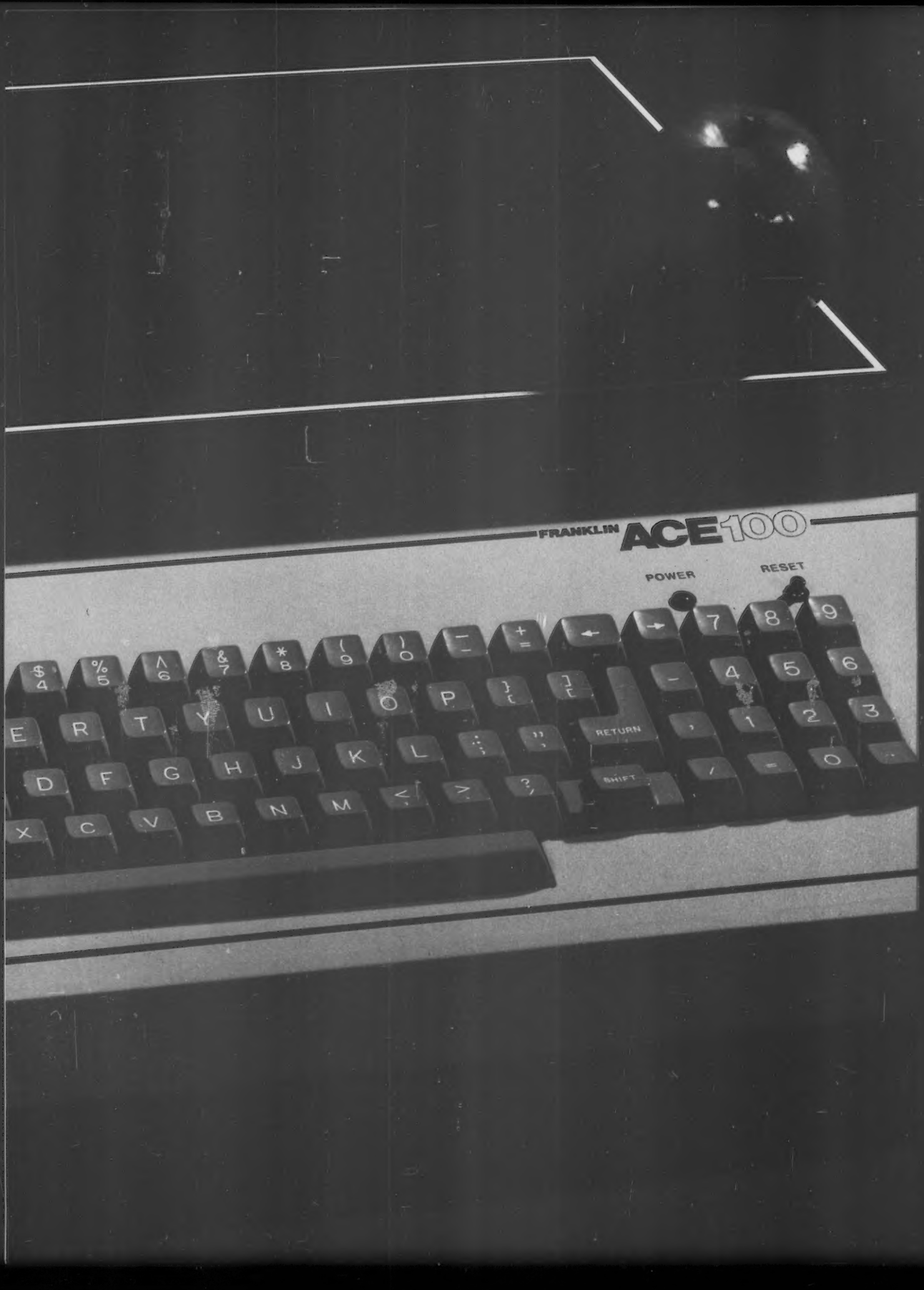
Contact your Dealer or Distributor.

ROCKROY INC.
Computer Products Division

7721 E. Gray Road
Scottsdale, Arizona 85260
(602) 998-1577
Toll-Free 800-528-2361

DiscSavers is a trademark of RockRoy Inc.

CIRCLE 229 ON READER SERVICE CARD


FRANKLIN ACE 100
POWER
RESET
RETURN
SHIFT

WHAT IS SWEETER THAN AN APPLE?

THE FRANKLIN ACE 100

The Franklin ACE 100 is hardware and software compatible with the Apple® II. It is sweeter because it is more versatile, it includes 64K of RAM memory and—it costs less.

Any program that runs on the Apple II will run on the Franklin ACE 100. Any peripheral that works with Apple will work with ACE. The Franklin ACE 100 generates upper and lower case characters and includes a numeric pad, an alpha lock key and VisiCalc® keys.

The Franklin ACE 100—a professional personal computer with the quality and reliability for the most demanding business applications. It is sweeter than an Apple. Call or write today for the name of your local authorized Franklin dealer.

FRANKLIN
COMPUTER CORPORATION

7030 Colonial Highway
Pennsauken, NJ 08109
609-488-1700

Franklin ACE is a trademark of Franklin Computer Corporation.
Apple is a registered trademark of Apple Computer Inc.
VisiCalc is a registered trademark of Visi Corp.

CIRCLE 159 ON READER SERVICE CARD

II for Apple II

PLUS VERSAbox FOR EVERYBODY

VERSAbox

The only intelligent SPOOLER/BUFFER with an optional REAL TIME CLOCK interface/display. For use with all Centronics parallel and RS-232C INPUT/OUTPUT interfaces.

VERSAbox's high-speed input combined with up to 60K buffer (more with character compression) frees up your computer from the slow job of printing. Modems and other compatible devices can also be buffered. Multiple software-selectable outputs permit you to choose between two or more VERSAbox outputs or use them simultaneously. You can buffer multiple inputs simultaneously too.

Add the optional REAL TIME CLOCK to VERSAbox and you get a six digit LED numeric time display. Your computer can read the time via the RS-232C port. Another useful option is the SWITCHED 120V SOCKET that can turn external devices on and off by clock control.

VERSAbox is supplied in an attractive, compact 11" wide, 8" deep, 3" high cabinet. Interface cables are available from your dealer or Prometheus. SPECIAL OFFER for Apple II owners: Buy a VERSAbox this month and you will receive a free parallel interface and cable.

VERSAbox, standard model with Centronics parallel INPUT/OUTPUT only and 16K buffer **$249.00**

VERSAbox, with both Centronics parallel and RS-232C INPUT/OUTPUT and 16K buffer **$299.00**

REAL TIME CLOCK option with DISPLAY ..... add **$150.00**

SWITCHED 120V OUTLET option ..... add **$50.00**

Additional 16K BUFFER MEMORY KITS each ..... add **$50.00**

I. VERSAcard

Four cards on one for Apple II: (1) Serial Input/Output Interface, (2) Parallel Output Interface, (3) Precision Clock Calendar, and (4) BSR Control. All on one card with TRUE SIMULTANEOUS OPERATION.

Before you buy Mountain Computer CPS or any other multifunction card, ask these questions:

Can I use CP/M and Apple Pascal with NO disk modification?

Does it have interrupts?

Will I be able to read and set the year?

Does it have BSR control?

Can I use DB Master? Ascii Express? VISI Dex? Easy Writer? WORDSTAR? Z-TERM PRO? VISITERM? . . . . other software packages?

If the answer is YES to all of the above, then you're talking about VERSAcard and ONLY VERSAcard. And, the list price has been reduced by $50 to **$199.00**

SPECIAL OFFER: Buy a VERSAcard and we'll sell you GRAFTRIX, a sophisticated screen dump graphics package, with $25 off the regular list price of $65 for only **$40.00.**

II. AUTO-DOC

An automatic diagnostics system for your Apple II computer. Get a complete check of your critical Apple hardware EVERY time you power-up.

AUTO-DOC saves TIME, ENERGY, and MONEY by identifying problems in your Apple before they make themselves known by system failures. And, you don't have to remember to insert a disk. DOC automatically identifies system problems before you run your programs by doing extensive system diagnostics. If DOC finds a failure, it indicates the problem area and, in some cases, the specific chip or component that's responsible.

DOC includes a memory test, processor test, ROM test, and more. In addition, extensive disk based diagnostics are included for further testing and subsystem checks for many popular peripheral cards.

AUTO-DOC is simple and easy to install. And once installed, DOC will always be there working AUTOMATICALLY everytime you power-up.

Can you afford to be without AUTO-DOC?

AUTO-DOC List Price **$99.00**

PROMETHEUS

PROMETHEUS PRODUCTS INCORPORATED

45277 Fremont Blvd. • Fremont, CA 94538 • (415) 490-2370

CIRCLE 221 ON READER SERVICE CARD

About Embedded Control Characters

Control characters are used by *Higher Text, Screen Machine,* and *HRCG* to control various generator functions. This has several advantages over the use of POKEs. Control characters require less memory when stored in programs and can be made more mnemonic, that is to say, more meaningful and easy to remember.

At the very least, it is easier to type a control character than a POKE sequence, and, since some functions require several commands, this advantage becomes more important as the user undertakes more complex projects.

Often control characters are used individually — to clear a screen for example. Control characters are typed while holding down the CTRL key. In this case it is often advantageous to use variables to represent the control characters. For example, with *HRCG* the variable CS$ might be set equal to a Control-P, which is the command to clear the hi-res screen.

The least obscure way to do this in Applesoft is through the CHR$ function, a feature which is unfortunately lacking in Integer Basic. Thus, in Applesoft we would use the line

```
900 CS$ = CHR$(16) : REM CTRL-P
```

to make the above mentioned assignment (the numbers to use may be found on pages 138, 139 of the Applesoft Reference Manual.)

The use of REM statements is virtually essential if this technique is not to cause trouble during some future debugging operation. Of course, it would be possible, and in fact necessary in Integer, to make the assignment directly like this:

```
900 CS$ = "": REM CTRL-P
```

You will notice that something is missing, namely the Control-P. It was typed between the quotation marks, but it is completely invisible in the listing. This brings us to the big headache in using control characters.

Unfortunately, the Apple does not display control characters on the text screen. This is more than just a nuisance, for it makes the standard Apple editor worse than useless for working with control characters.

When the cursor is used to copy characters while editing, it can copy only those characters which actually appear on the text screen. Since control characters do not appear, they are not copied and are deleted whenever a line is edited. And, of course, the user does not know about these deletions until his program bombs for no apparent reason.

What is needed is an editor which will both make the control characters visible and permit lines containing them to be modified.

The first solution I encountered was Program Line Editor (PLE), which gets my vote for the most useful programming utility ever created for the Apple. Its talents deserve an article by themselves, but one is particularly important here. PLE incorporates a line-based editor which is infinitely easier to use than the cursor based editor native to the Apple.

One feature of this editor is that control characters are displayed in inverse during the editing process. Thus, once a suspect line is identified and accessed by the editor, it may be edited without any of the side effects mentioned.

Incidentally, one other nice feature of PLE is that it permits the entry of lower case from the Basic environment, that is to say, without the need to have a character generator up and running; this can be quite an advantage. PLE is compatible with Integer and will make all of your Basic programming ten times easier.

Unfortunately, PLE does not make control characters visible in listings. For this we turn to the Applesoft Programmers Aid (APA), which is included with *HRCG* in the DOS Tool Kit. APA has many features, but the one of importance here causes all control characters to be shown on the screen whether they appear in listings, catalogs, or whatever.

These control characters appear as inverse figures on the video screen. Once a line is listed along with its embedded control characters, the line may be edited with the standard Apple editor. Although this is slow when compared to PLE, there is a great advantage to having all control characters in a listing made visible instead of having to go into an editing mode to visualize them.

Unfortunately, APA requires DOS 3.3 and Applesoft, so Integer Basic users are left with PLE. Also unfortunately, the control characters still do not appear in printed listings.

Tape users will notice that these are both disk-based utilities. However, the problem of control characters is considerably less severe with *Screen Machine* — which uses only two control characters — than with *Higher Text* or *HRCG,* and it is non-existent with *Hi-Res Character Generator,* so the disadvantage is not really that severe.

creative computing
SOFTWARE PROFILE

Name: Screen Machine

Type: Graphics Utility

System: Apple II (or Apple II Plus)

Format: Disk (DOS 3.3)

Language: Machine Language

Summary: Easy to use; does the basic jobs

Price: $29.95

Manufacturer:
Softape
10432 Burbank Blvd.
N. Hollywood, CA 91601

control program and a character table be loaded somewhere out of the way in memory. With disk systems this is accomplished easily by BLOADing the generator into the required location.

Screen Machine works in a different way. The control program and character table are contained in a prefix, a unit which can be appended either to Integer or Applesoft programs. The prefix becomes a part of the program and is saved and loaded with the same operation as the program.

When the program is run for the first time, the control program relocates itself into an appropriate section of memory. Thus, one program may be created which will run conveniently on either disk or cassette systems without modification.

The first step in using *Screen Machine* is to create the prefix. When *Screen Machine* is run, it presents the character font editor. The user is shown a full upper and lower case font along with a variety of punctuation marks and special symbols.

At this time any special characters which may be needed are defined through use of a 7x8 grid. Within this grid, points are turned on or off to create the characters. When a character is finished it is stored back into the character font.

It is possible to assign that new character to any letter, number, or special symbol, or to give it a hexadecimal assignment. With a hexadecimal assignment, a normally unavailable character such as a "[" (hexadecimal $5B) can be used, permitting all standard characters to remain avail-

able. In Applesoft, the CHR$ function may then be used to print that character. In Integer, a function like CHR$ is provided by *Screen Machine.*

When the character set is completed, it is output to tape or disk in the form of a prefix which contains everything needed to print hi-res text. Then a Basic program is created to use the prefix.

While the program is being created, the prefix may be run directly from disk or tape, but when the program is fully debugged, it is joined with the prefix so that they may be loaded in one operation.

While the prefix is running within the program, all functions are controlled by CALLs and POKEs. This is made more convenient by assigning variables to the addresses to be used; thus CALL HM would be used instead of CALL 897 to clear the background and home the cursor. I have written an initialization subroutine which I append to any program which will use *Screen Machine.* Since I use the same variable names in every program, I pretty much know them by heart.

It is possible to perform nondestructive character animations with *Screen Machine,* since either page may be used as the primary or secondary page. This is a little more difficult to do with *Screen Machine* than with the Apple *HRCG,* but animation is at least available to the tape user.

Among the things *Screen Machine* does not offer is colored text. All text is either normal or inverse — black and white. This is not a fault of *Screen Machine,* but is a symptom of the Apple hi-res system. Actually the only package that does offer colored text is *Higher Text,* which does so only for enlarged fonts.

All things considered, *Screen Machine* is an impressive package. It is low in cost, usable with tape or disk, and provides versions for both Integer and Applesoft. The most severe limitation is the fact that the user is limited to having one font available.

This means that, if a great many special characters are needed, something must be given up, such as lower case. However, the ease of use and compact size of *Screen Machine* still recommended it for a great many hi-res text applications.

Higher Text

Perhaps the most distinctive features of *Higher Text* are its versatile text modes and its colored text. *Higher Text* is the only package of the four that allows enlarged text, which may in turn be printed in up to nine colors. Just about anything you would want to do with a text generator is possible with this remarkable piece of software.

Fonts are created in two basic flavors: standard size (7 x 8 dots, 40 x 24 characters on screen) and large font size (14 x 16 dots, 20 x 12 characters on screen).

creative computing
SOFTWARE PROFILE

Name: Higher Text II
Type: Graphics Utility
System: Apple II
Format: Disk (Apple DOS 3.2)
Language: Machine Language
Summary: Does it all.
Price: $40
Manufacturer:
Synergistic Software
5221 120th Ave. S.E.
Bellevue, WA 98006

In addition, the standard size fonts may be manipulated in various ways. They may be wide (20 x 24 characters), tall (40 x 12 characters), or expanded (20 x 12 characters).

You may be wondering why there are both expanded and large font characters when both are the same size. Expanded characters are merely enlarged versions of the standard character set, and can contain no more detail than exists in a 7 x 8 matrix.

Large font characters are defined in a 14 x 16 matrix and can thus be far more detailed. This is best illustrated by the sample fonts included in the package, such as a very impressive Old English. Conceivably, large characters could be created for animation purposes by using the large font.

Wide, expanded, and large font characters may be printed in colors. Expanded and large font characters have four new colors in addition to the standard Apple six; pink, yellow, aqua, and blue violet are created by mixing standard colors on alternate lines of the screen, and while they tend to be a bit fuzzy, they are welcome relief from the normally limited Apple palette.

Additionally, the user may select text on a colored background. While it is not easy to display colored text on colored backgrounds due to the idiosyncratic way in which the Apple creates its colors, various combinations of white, black, and colored text and backgrounds may be used effectively. A helpful chart is provided and makes it easy to select combinations of text and background colors which will work well together.

Most functions are controlled by embedded control characters, a feature which causes special problems during program development. It would be nice to be able to write programs while *Higher Text* was in effect. Because a standard Apple displays lower case characters as nonsensical punctuation marks, this ability would allow the user to see the lower case characters as recognizable text instead of mishmash.

Unfortunately, when you type a control character into a Basic line, it takes immediate effect. Suddenly, your listing is in big, purple letters and your entire line will not fit on the screen.

Additionally, listings within *Higher Text* are monotonously slow. So the solution seems to be to write in a normal Basic environment, perhaps with the aid of Program Line Editor. This is regrettable, but probably unavoidable.

A nice touch is that *Higher Text* modifies the normal bell sound produced by the Apple speaker. When *Higher Text* is operating, the bell is both more interesting

Frankenstein **Robert Cavey**

Announcing the Printing Breakthrough of the Century: Smith-Corona® TP-1™ Text Printer

Mr. Robert Jenkins, Pres.
Magillon Data Corp.
4345 Weston Avenue
Kingston, MD. 54607
Dear Mr. Jenkins,
Thank you for your interest in our new data printer. The enclosed specifications will give you all of the technical information you requested, but far more important will be the specific applications to which the printer will be put.
SMITH-CORONA TP-1

- Low Cost Daisy Wheel Printer

$845.00

- Microprocessor Electronics
- Serial or Parallel Interface
- Simple, Reliable Mechanism

ACT NOW: Limited Supply, Low, Low Cost

Smith Corona, one of the largest manufacturers of small printers in the world, gives a whole new perspective to printing with their electronic text printer—**TP-1.** The **TP-1** is a microprocessor controlled, high quality **daisy wheel printer.** It produces perfectly formed, executive quality printouts at the speed of 120 words per minute. Typewriter quality printing at dot matrix prices.

Simple, durable and dependable, **TP-1** may be used with word processing systems, microcomputers and most small business systems. Compact and attractively styled, the **TP-1** blends well with any setting.

Now, all your letters, documents forms and reports can have the crisp, professional look you demand—for business or personal use—at an affordable price. **TP-1,** the electronic text printer.

Additional daisy print wheels $4.95

Additional ribbons $2.95

Don't delay. Order your **TP-1** TODAY at the low price of **$845.**

Micro Printer Marketing offers same day shipping, nationwide service and invites dealer inquiries. Catalogues available. No shipping charges on pre-paid orders.

Micro™ Printer Marketing

Call Micro-Printer Marketing

CALL TOLL FREE **1-800-523-9859**

In PA Call Collect **215 / 433-3366**

MasterCard and Visa Accepted

CIRCLE 147 ON READER SERVICE CARD

Using High-Resolution Character Generator

The complete generator has two components, the Hi-Res Character Generator and the Character Table. These must be loaded, either from disk or tape, into some unused section of memory. Cassette users should consult the new Reference Manual pp. 46-48 for a discussion of tape saves and reads in the monitor.

Tape users may obtain copies of the two components by proceeding as follows. If you are unfamiliar with disk, get some help.

1. BLOAD HI-RES CHARACTER GENERATOR, A$6000
2. CALL -151 (You are now in monitor)
3. Follow the saving procedures on page 46 of the Reference manual, using the following command: 6000,60FF.W.
4. Stop but do not rewind your tape.
5. Reenter Basic (Press RESET with Autostart ROM)
6. BLOAD CHARACTER TABLE,A$6000
7. CALL -151
8. Save to tape with the following command: 6000,64000.W.

Hi-Res Character Generator may be loaded beginning at any address which is an even $100, and requires 256 bytes. The documentation suggests loading it at $6000 (that is 24576 decimal, right above Hi-Res page 2).

From disk, just BLOAD HI-RES CHARACTER GENERATOR, A$6000. From tape, drop into monitor (CALL -151), prepare your tape, and type 6000.60FF R. Before you press Return, start your tape. When you hear the first beep the load is complete.

The suggested location for the Character Table is $6800. You can do a BLOAD CHARACTER TABLE.A$6800 from disk. From tape type 6800.6C00 R and proceed as you did with the Generator.

Now you must tell the program where to find itself. To do this, POKE 54 with the decimal equivalent of the low byte of the starting address of the Generation; this is always 0, to POKE 54,0. POKE 55 with the high byte of the Generator address. This is $60 in our example, which is 96 in decimal, so we POKE 55,96.

Next, at least 1 character must be printed, so let's PRINT " ". Finally, 972 is POKEd with the high byte of the address for the Character Table. For our example, this is $68 or 104 decimal. The whole sequence is as follows:

```
POKE 54,0
POKE 55,96
PRINT " "
POKE 972,104.
```

From here on, anything you print will appear on Hi-Res page 1, which, of course must be turned on.

A few more commands will come in handy:

```
POKE 973,255 sets inverse printing,
POKE 973,0 returns to normal text,
POKE 973,1 exclusive-ors new text
           with the background,
PRINTing a Control-L will clear the
           screen (Home no longer works),
POKE 974,64 prints on Hi-Res page 2,
POKE 974,32 prints on Hi-Res page 1.
```

To turn off *Hi-Res Character Generator* execute a PR#0 and a TEXT command. The Generator is restarted with POKE 54,00 and POKE 55,96.

and more pleasing. A key click feature may also be engaged to provide auditory feedback for each key press.

Now for a bit of bad news. You will notice in the comparison chart that *Higher Text* is quite a large program. To be sure, this bulk includes three fonts, but if you only need one, a great deal of memory goes to waste. To take full advantage of the package, you need a 48K machine, although a 32K machine can function to a limited degree.

The other bit of bad news is bad only for Applesoft users. *Higher Text* is not a relocatable program as are *Screen Machine* and *HRCG*. As a consequence it is designed to load at $7fd which overlaps with the beginning of program storage for Applesoft at $801. Thus, the Applesoft program must be moved upward in memory to make room for *Higher Text*.

Ordinarily this is no easy matter, but fortunately, a utility is provided to do the job. The program LOMEM: relocates the Applesoft program in residence, and resets all of the memory pointers to new, correct values. *Higher Text* is loaded into the space vacated by the program. This can all be accomplished either from within a Basic program or by an EXEC file.

If I could own only one text generator, *Higher Text* would be my choice. It does everything, perhaps not as conveniently as the more specialized packages, but it does them. It also does things which others cannot do at all.

Perhaps the only serious lack is its inability to print characters upside down, on their sides, or as mirror images, a feature which I don't use too often anyway. (Actually, I understand that this has been incorporated in the recently introduced *EZ Draw 3.3* from Sirius Software, which includes *Higher Text* as its text generator.) This is a minor omission, however. I own few pieces of software that please me more than does *Higher Text*.

HRCG

This is a second text generator from Apple. This time it appears in the DOS Tool Kit. Actually, the Kit includes a coordinated trio of programs which add up to a complete text and animation system.

The second program of the group is the Applesoft Programmer's Assistant (APA) which, among its other talents, makes the embedded control characters of *HRCG* visible in listings. Finally, Animatrix is used to create characters for *HRCG* fonts and for character animation.

HRCG has the best-designed command structure of the four generators. Only control characters are used in the program, and the letters chosen for each command are generally easy to remember. The command set is exceptionally powerful and convenient, making *HRCG* the easiest of the four generators to operate.

HRCG is a versatile text generator in that as many as 10 fonts may be loaded at one time; 21 fonts are provided with the Tool Kit. The current font is program selectable. Thus, some of the complex demonstration programs provided with DOS Tool Kit use as many as three fonts in addition to the normal text font. This is possible, but far less convenient with

creative computing
SOFTWARE PROFILE

Name: HRCG (from Apple's DOS Toolkit)

Type: Graphics Utility

System: Apple II Plus (or Apple II with 64K), DOS 3.3

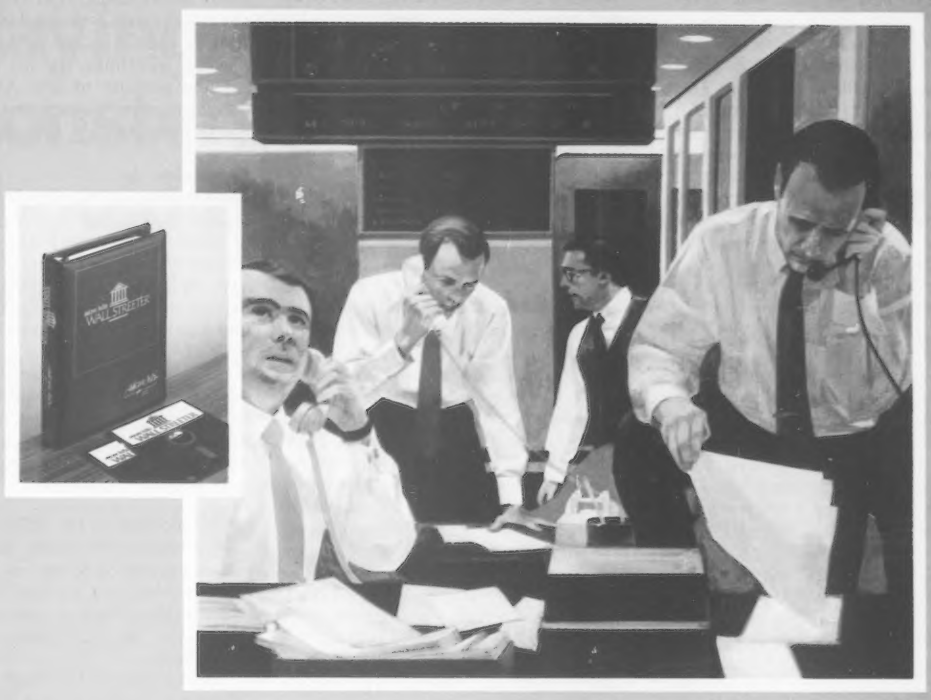
Format: Disk (Apple DOS 3.3)

Language: Machine Language

Summary: Easiest to use; best for animation.

Price: $75

Manufacturer:
Apple Computer, Inc.
10260 Bandley Dr.
Cupertino, CA 94017



A new aid to decision making

micro lab's WALL STREETER

Project transaction decisions with this new portfolio management program. It allows you to enter, by hand or modem, Friday's closing stock prices, Standard & Poor ratings, Beta ratings, Value line timeliness and safety factors and price-to-earnings ratios.

To help in decision making you may want to use a standard formula or one that you tailor to fit your financial outlook at the time. Feel more bullish? Just change the formula and it is easy to go back to the old one. It will indicate stocks you may want to buy or sell, sell short or hold.

See Wall Streeter today at your local Micro Lab dealer. Micro Lab is the home of User/Friendly computer software.

micro lab
systems that work

2310 Skokie Valley Road, Highland Park, Illinois 60035, 312-433-7550

It's like having your own team on the trading floor!

CIRCLE 182 ON READER SERVICE CARD

Higher Text and *Hi-Res Character Generator.*

Where *HRCG* really excels is with animation. The demonstrations provided are nothing less than stunning. This versatility arises from the powerful command structures and from the convenience of Animatrix. Animatrix creates a series of characters that fit together to form a large figure. All of the information needed to print that figure may be placed into a single string which may be printed by a single PRINT statement.

This is possible by virtue of three block printing commands. After the initial print location is determined by HTABs and VTABs, printing a Control-B declares the top and left margins of a block. After the first line is printed, a Control-C moves the cursor down one line and left only as far as the first space in the block. This can be repeated as many times as necessary to complete the block, which is terminated by a Control-D. Thus, for each line there is a saving of an HTAB and a PRINT statement.

Since so many Basic commands are eliminated, an *HRCG* block print runs much faster than the equivalent process on, say, *Higher Text*. The resulting animations are stunningly fast for what is essentially a Basic program. They are so fast that they often must be slowed down by timing loops. In fact, this is the really big reason to prefer *HRCG* over *Higher Text* for some purposes. This is probably the only really fast way to animate using Basic.

Animatrix deserves special mention since it is the most convenient font editor I have used. The overall effect is one of a large grid in which grid characters may be placed in up to five rows of seven. Thus, it is possible to see a large animation shape as a total entity, both enlarged and as it will appear on the hi-res screen.

It is also possible to link together several of the cells in the large frame, so that the same character can be created in several cells at once. I have used this to create a rolling ball, first creating four featureless balls, and then adding different detail to each one to create an animated sequence.

With the large grid, it is possible to see an entire alphabet as it is created, so it is easy to achieve stylistic consistency from character to character.

Another reason for my love of Animatrix is that the editing cursor is controlled by the same paddles, resulting in very fast character design. A joystick makes the process almost effortless and as close to fun as a tedious job is likely to come.

Because of its efficiency, I have often designed characters on Animatrix and then transferred the designs to *Higher Text*. While similar characters may be designed within *Higher Text* or *Screen Machine*, the process is far less convenient.

Now for the bad news about *HRCG*. In order to make the program usable with different memory configurations, it was made relocatable. Thus, it is loaded in at the top of memory — wherever that may be. The procedure for doing so is fairly involved — especially when additional fonts are loaded — and is not very well documented.

In fact, to find out how to load additional fonts, you must look to the remarks in the demonstration programs (LOADHRCG is probably best) for instructions. If you don't have a printer, locate one and make a printed listing of one of these programs; this is so essential that such a printed listing should have been provided with the documentation.

While you have the printer fired up, it would be extremely useful to get a printed listing of the program RIBBIT also. Then use APA to list the control characters to the screen. You can then fill in the control characters on your printed listing and learn a great deal about *HRCG* in the process. These listings will be invaluable reference pieces.

Of course, once you have figured it all out, you can write up a standard initialization subroutine based on LOADHRCG and use it in all of your programs.

My complaints concerning *HRCG* include the difficulty involved in loading it, its lack of variable size and colored characters, and its lack of colored background control. Adding color and size control would have increased the size of the program, however, reducing the number of fonts that could be stored at one time and probably slowing it down.

Where *Higher Text* was designed for maximum versatility, *HRCG* excels where clean control structures are important. Aside from loading, *HRCG* is very easy to use and requires little mucking about with POKEs and CALLs to hard-to-remember machine locations. It is, therefore, a genuine pleasure to use. Although it is limited in some ways, everything *HRCG* was designed to do it does extremely well.

Conclusion

While writing this article I have gone back to look through the manuals dozens of times. Each time I do, I find some feature of one of the generators which I have failed to include. So I rewrite a paragraph to include that feature, only to find another lurking in some corner of the manual.

In other words, these are, without exception, well-designed packages which have tremendous potential for the innovative user. Whichever one you obtain you will find it a powerful and valuable aid to your programming creativity. □

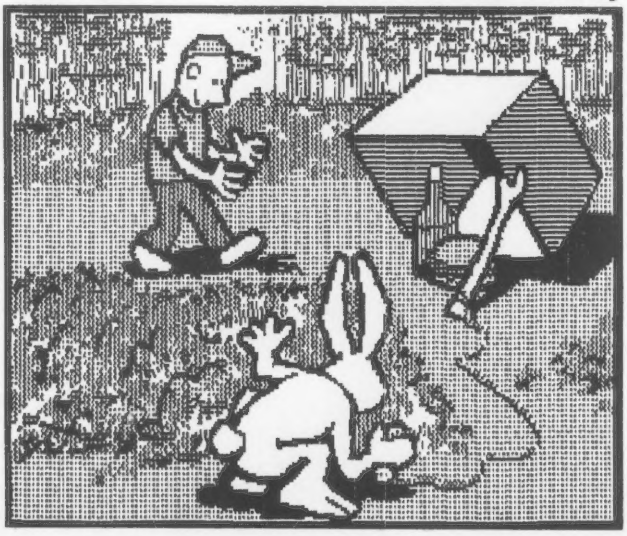
In addition to the utility programs described in this article, many larger packages include hi-res text generators. These packages include slide show editors, plot programs, general graphics packages, languages and even word processors.

Here is a *partial* list of such programs: *Executive Briefing System* (Professional Software Technology), *Screen Director* (Business and Professional Graphics), *100 Color Drawing System* (Penguin Software), *E.Z. Draw 3.3* (Sirius Software), *Apple Pilot* (Apple Computer), *GraForth II* (Insoft) and *Screen Writer II* (Online Systems).

Look for in-depth reviews of all these programs in this and other issues of *Creative Computing*. — MC

Free Lunch

Robert Cavey



Slaying Monsters Should Be Mostly Fun and Games

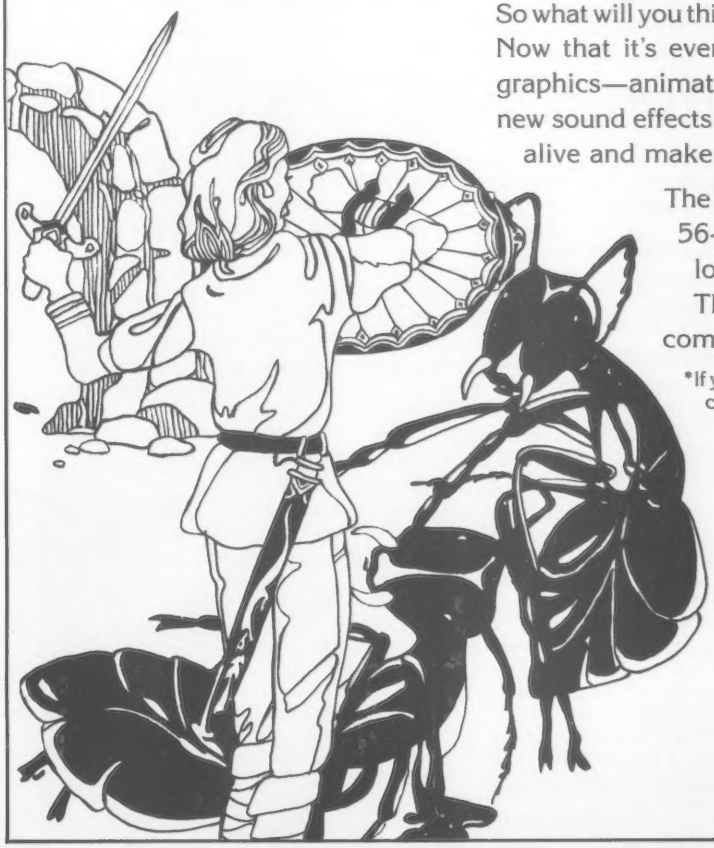
Be one of more than 16 million alter-egos that your computer can generate. Walk into a labyrinth filled with traps, treasures and monsters. There you'll test your strength, constitution, dexterity, intelligence . . . against thousands of monsters in over 200 caverns and chambers—growing in wealth, power and experience as you progress through the four levels of the dungeon.

Your character will do whatever you want him to do. Do battle—in real time—with the likes of giant ants, ghouls, zombies...Explore the various levels of the maze and discover the great treasures within.

The Game Manufacturer's Association named The Temple of Apshai the computer game of the year. The Temple is the very first computer game—ever to win the Hobby Industry award for excellence. There can be only one reason for that: it's a great game.

So what will you think of The Temple of Apshai now? Now that it's even better than ever. With better graphics—animated movement—and completely new sound effects that make your computer come alive and make The Temple even more fun.*

An EPYX game from Automated Simulations



The Temple has a superbly illustrated 56-page Book of Lore, and your local dealer has it for the ATARI,** TRS-80,** APPLE,** and IBM** computers.

*If you already have The Temple of Apshai, you can enjoy these great improvements. Just send us your original cassette or disk together with your check for $5.00 and we'll send you the brand new version—with better-than-ever graphics and sound.

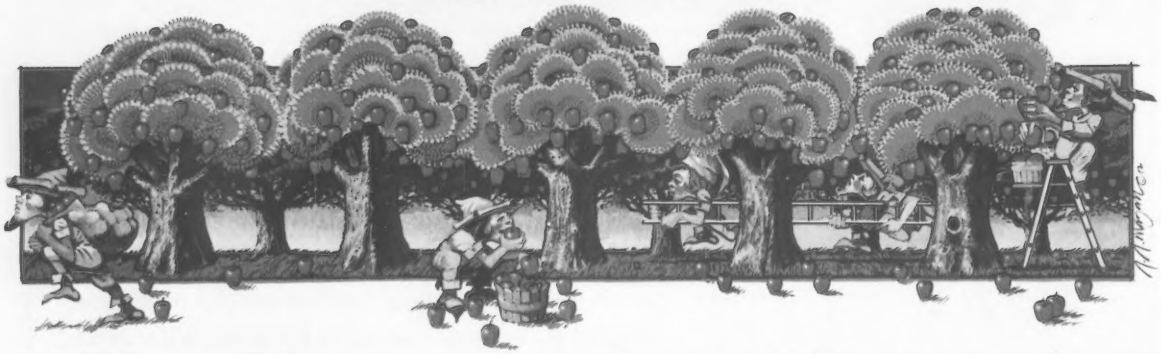
**ATARI, TRS-80, APPLE and IBM are trademarks of Atari, Inc., Tandy Corp., Apple Computer, Inc., and IBM, respectively.

©1981, **AUTOMATED SIMULATIONS, INC.,** P.O. Box 4247, Mountain View, Ca., 94040.

EPYX COMPUTER GAMES THINKERS PLAY

CIRCLE 110 ON READER SERVICE CARD

Turn your Apple* III into an Orchard



With software from Quark™ Engineering

Quark Engineering brings you software specially designed for your Apple III. Easy-to-use products that dramatically increase your system's capabilities. And **your** productivity.

You start with Word Juggler™, the most easy-to-use word processor available for the Apple III. Word Juggler is written in assembly language. And comes with special keyboard templates to label important functions.

Word Juggler retails for $295. Form letter and simple mailing list capabilities are included free. If you want even more capacity, you can interface with Apple's Mail List Manager for an additional $35.

Need to check your spelling? Add Lexicheck™. A high-performance spelling checker with a 25,000-word dictionary. You can add your own words. And get more accurate documents, without a lot of proofreading. The price? Less than a penny a word. Only $195.

You can even send text from Word Juggler to computerized typesetting equipment. All you need is TypeFace™. Interface software which cuts your typesetting costs and eliminates re-keying errors. $175.

Finally, there's TranScribe™. A spooler designed especially for hard disk drives. TranScribe lets you use other computer functions while you're printing. And it's compatible with most Apple III software. $125.

There's much more to tell you about Word Juggler, Lexicheck, TypeFace and TranScribe. See them at your local dealer. Or contact us today. We'll help you turn your Apple III into an orchard. And from then on, you'll find easy picking.

Quark Engineering
1433 Williams, Suite 1102
Denver, CO 80218
(303) 399-1096

QUARK™ Engineering

*Apple is a registered trademark of Apple Computer, Inc.

CIRCLE 223 ON READER SERVICE CARD

creative computing software evaluation

A Graphic Language That's Downright Forthright

Michael Coffey

creative computing
SOFTWARE PROFILE

Name: GraForth II

Type: Graphic Language

System: Apple II (or Apple II Plus)
48K One Disk Drive

Format: Apple 16 Sector Disk
(DOS 3.3 compatible)

Language: Machine Language

Summary: Good value for graphics programmers

Price: $75

Manufacturer:
INSOFT
10175 Barbur Blvd.
Suite 202B
Portland OR

Paul Lutus has put together quite a bag of tricks for all you Apple II graphics programmers. If you've been trucking along with Apple Basic or Pascal, you will appreciate the completeness of this new package. If you are a newcomer to the field, you will be dazzled by the three-dimensional animation made possible by *GraForth*.

GraForth is more than just a utility package: it is a language for conversing with your computer about graphics. What's more, you can customize *GraForth*, extending and modifying it until you have devised your own personal language for your personal computer.

Conversational Graphics

The first thing you want to do with any graphics package is make pictures. In *GraForth II*, you can immediately begin typing commands that draw on the screen. Without much preparation, you can plot points of several colors, draw lines and clear the screen. Each graphics command affects the screen immediately. Soon, you learn how to erase individual lines, create colored rectangles and reverse the colors on the screen.

Turtle Talk

As you continue to experiment, you will find yourself playing with "Turtle Graphics" commands. Turtle graphics is just another way of drawing lines and pictures on the screen.

Apple Basic, like many systems, forces you to use Xs and Ys to draw pictures. In addition to X-Y graphics, *GraForth II* provides a picture drawing technique called "turtle graphics," in which an invisible electronic turtle moves around the screen, leaving a trail as it goes.

You tell the turtle where to go by telling it when and how far to move and when and how much to turn. By putting together a series of "MOVE" and "TURN" commands, you create pictures.

Character Building

Let's say you want to make a moving picture that contains many small, moving objects. "Character graphics" was designed for you. With character graphics, you draw each of your little objects in advance and save them in a "character set."

Once you have built a character set, you can print your objects on the screen just as if they were letters or numbers. Through rapid repeated printing and unprinting, you can create the illusion that your objects are scooting about on the screen.

Computer Graphics of the Third Kind

Computer people have a saying that goes "It's hard to make things easy." Most 3-D graphics programs serve as profound arguments to support that slogan. Indeed, the most difficult section of *GraForth II* is the 3-D section.

GraForth excels at drawing and moving 3-D images. It can make them expand or shrink or stretch in three directions. You can put up to 16 different 3-D images on the screen at one time and make them all move.

With some practice, you may be able to make animated rocks or daggers or lips zoom in at the viewer. You could also animate scientific things like molecules or body organs.

You will probably experience some difficulty creating your own images to animate. It just isn't easy to draw a three-dimensional object on a flat surface.

The 3-D editor in *GraForth II* does a better job than most programs because it lets you see what you are creating while you are doing it.

Great Caesar's Ghost

Normally, *GraForth II* translates your typed lines into funny bits so that the computer can execute them quickly. A text

AIRSIM - 1™
Flight Simulator

Close to the ultimate in airplane simulation for the **Apple II** computer.

FLICKER-FREE 3-D SCENERY. BOSTON TO NEW YORK CITY.

SIX LANDING FIELDS — HOME, 2 TRAINING FIELDS, BOSTON, MARTHA'S VINEYARD, AND NEW YORK.

ACCUMULATE SCORES FOR SUCCESSFUL LANDINGS AT HOME OR TRAINING FIELDS.

REALISTIC DYNAMIC MODELING OF AIRCRAFT.

AEROBATIC — LOOPS, STALLS, ROLLS, INVERTED FLIGHT, IMMELMANN TURN, AND MORE.

INSTRUMENT FLYING EQUIPMENT — ARTIFICIAL HORIZON, VOR'S AT 4 FIELDS, GLIDE-SLOPE INDICATOR, HORIZONTAL-SITUATION INDICATOR (HSI), RADAR, BALL-BANK INDICATOR.

OPTIONAL INSTRUMENT FLYING MODE — CLOUD CEILING 500 FEET.

WRITTEN IN MACHINE LANGUAGE.

FOR APPLE II OR II+ WITH 48K RAM, 1 DISK, APPLESOFT ROM OR EQUIVALENT.

master charge

$40.00
for diskette and manual.

VISA*

Mass. residents add 5% ($2.00) sales tax.
Overseas shipping add $3.00.

MIND SYSTEMS CORPORATION

P.O. Box 506
Northampton, MA 01061
(413) 586-6463

*Apple is a trademark of Apple Computer, Inc.
Airsim is a trademark of Mind Systems Corporation

CIRCLE 192 ON READER SERVICE CARD

editor makes the computer remember your lines the way you typed them, so that you can look at them again and change them. The editor can also record your text creations on disk.

GraForth II comes with a text editor and can also use the output of many other editors (including some of the most popular word processors).

The *GraForth II* editor uses line numbers (a la Basic) and can automatically number and renumber your lines as you type them. Automatic renumbering sounds neat but you will have a hard time adapting to it, *especially* if you also use Basic.

Intra-line editing is exactly as built in by Apple, with one enhancement: an "insert one space" command. Cursor control is exactly as built in by Apple: you must master a confusing collection of "pure cursor move," "destructive backspace" and "retype" commands.

In a 48K Apple, the *GraForth II* editor can hold on to between 50 and 100 lines of text. With 64K, you get 300 to 600 lines.

Personalizing the Language

In *GraForth II* you can use abbreviations, compound words, jargon and slang more or less as you do in English.

If you don't like to type the word "ERASE," you can establish the letter "E" as an abbreviation for "ERASE." As a result, you would never have to type "ERASE" again.

If you would rather say "DISPLAY" than "PRINT," you can establish "DISPLAY" as an alias for "PRINT." When you find yourself typing the same group of commands repeatedly, you can establish a new word to use in place of that group of commands. All programming in *GraForth II* is done through this process of word defining.

GraForth vs. Forth

Many micro hackers enjoy a language called Forth. In their eyes, Forth is very similar to a good assembly language. They may also appreciate the ability of Forth to run on many different computers. If you use a standard Forth, you should be able to develop Forth words on one computer and use them on another.

GraForth II is not a standard Forth. Practically none of the features I've described would be found in standard Forth. Furthermore, *GraForth II* uses error handling, disk management and input/output techniques that conform to no known standards. Unless you are a professional programmer, you need not worry about Forth standards.

What's Missing

GraForth II does almost everything that a graphics language should do. It cannot, however, calculate fractions or very large numbers. Consequently, you would have trouble with scientific plotting. It does nothing to simplify the use of a printer. You can print text if you are clever (or very experienced with the Apple). You can print graphics only if you are really on the ball and have spent some extra money on a "graphics dump" program.

GraForth II also lacks a ready means to use paddles or joysticks. You can forget about other add-on hardware unless you are totally comfortable with ROM calls, PEEKs and POKEs.

Compared to Other Languages

Look both ways before choosing a language for your personal computer. Among the many languages available, Basic, Pascal and Logo predominate.

GraForth vs. Logo: Logo is considerably easier to learn than GraForth. It offers an adequate full-screen editor and the ability to invent new words.

Logo offers fewer graphic features than GraForth but does include both X-Y graphics and turtle graphics. Optional features for Logo will probably be offered in the near future. Look for in-depth reviews of Logo systems for the Apple II in other issues of *Creative Computing*.

GraForth vs. Basic: Applesoft Basic comes free with the Apple II Plus, so it has a price advantage over GraForth. You get the built in X-Y graphics features. You also get more convenient arithmetic facilities, including floating point numbers (for fractions and large numbers) and algebraic notation (e.g. A=B+C).

Three-dimensional, character and turtle graphics can all be added by purchasing utility software, but you must choose utilities carefully, because some are quite difficult to use.

If you really enjoy Applesoft Basic, you should probably stick with it. After all, Applesoft is understood and supported by more software authors than any of the other languages mentioned here.

GraForth vs. Pascal: Pascal offers some degree of compatibility with other computers. Apple Pascal comes with an adequate full-screen editor, but it costs more than any of the other languages mentioned here.

Standard features of Apple Pascal include X-Y and turtle drawing. Apple publishes 3-D and character graphics options for Pascal and Fortran. The packages are called *Applegraphics II* and *Pascal Animation Tools*, respectively.

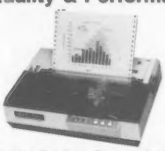
Do You Want It

If you really want to produce high quality 3-D animation, buy GraForth II. For 2-D animation, all the languages are equally good. If you just want to experiment and learn about graphics, get Logo or stick with Basic. If you are very curious about Forth or about computer languages in general, buy this one because it is fairly easy to learn. □

OUR PRICES, SELECTION AND SAME-DAY SHIPPING MAKE US COMPETITIVE. OUR PEOPLE MAKE US EXPERTS.

Red Baron. Home of the Nation's Largest Computer Printer Inventory.

NEC 8023
Outstanding Graphics, Print Quality & Performance



144 x 160 dots/inch • Proportional Spacing • Lower case descenders • N x 9 dot matrix • 8 character sizes • 5 unique alphabets • Greek character set • Graphic symbols • 100 CPS print speed • Bi-directional logic-seeking • Adjustable tractors • Single-sheet friction feed • Vertical & horizontal tabbing

NEC 8023
Dot Matrix . . . . . List $795 **$Call**

IDS Paper Tiger Prism 80/132
Affordable Color, Speed

Dot Resolution Graphics • 9-wire staggered printhead • Lowercase decenders • Over 150 CPS • Bi-directional, logic-seeking • 8 character sizes • 80-132 columns • Hi-res dot graphics • Proportional spacing • Text justifications • Optional Color

Prices Begin At

Prism 80 . . . . . List $999 **$700**
Prism 132 . . . . . List $2095 **$1895**

NEC Spinwriter 7700 & 3500
Daisy Wheel Quality Leader

High speed, letter quality • 55/35 CPS • Typewriter quality • Bi-directional printing & proportional spacing • Quiet • OCR quality print • Hi-res plotting/graphing • Quick change ribbon • Optional cut-sheet feeder, horizontal or bidirectional tractors • Prints up to 8 copies.

NEC Spinwriter RO
Serial Parallel 77xx . . . . List $3055 **$2575**
35xx . . . . List $2290 **$1975**

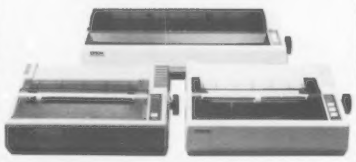
Televideo CRT's
Price, Performance & Reliability

910 . . . . . List $699 **$600**
925 . . . . . List $995 **$750**
950 . . . . . List $1195 **$970**

Other Quality Printers at Red Baron

	List	Discount
Anadex 9501	$1650	$1300
C. Itoh 8510 Prowriter	$795	$Call
C. Itoh Starwriter	$1895	$Call
C. Itoh F-10	$1995	$Call
Diablo 630/6	$2995	$2570
QUME Sprint 9/45	$2475	$2150

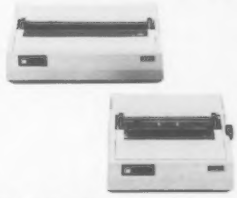
The Epson Series
High-Quality Printers at a Low Price.



Epson MX80 . . . . . List $645
Free Graftrax
Epson MX80FT . . . . . List $745 **$Call**
MX100 . . . . . List $995

Full Line of Epson Acessories.

The Okidata Series
Hi-Res & TRS 80 Block Graphics



120 CPS • 9 x 9 Matrix • Bidirectional logic seeking printing • Lower case descenders • Four print styles • Optional Hi-Res Graphics

Okidata 82A . . . . . List $649 **$480**
Okidata 83A . . . . . List $995 **$745**
Tractor Option $65

Interface Equipment
Complete Stock of Options, Cables and Accessories.

GRAPPLER APPLE INTERFACE	$175
CCS APPLE SERIAL Interface & Cable	$150
ORANGE INTERFACE for Apple II Parallel Interface Board and Cable	$110
NOVATION D-CAT direct connect modem	$180
COMPLETE STOCK OF EPSON ACCESSORIES	$Call
CUSTOM PRINTER CABLES FOR Apple, Atari, IBM, TRS-80 (all models)	$Call
HAYES MICROMODEM	$300
PRINTER STANDS: Large	$99
Small	$25
PRINTER RIBBONS—Most Types	$Call

Our People, Our Product: Both Are Specialized.

Red Baron is an organization of computer printer specialists. They know the capabilities of each printer, and how to match one to your exact need. Call for expert consultation today!

MasterCard VISA

Member Better Business Bureau

Here's How To Order:

Phone orders are welcome; same-day shipment on orders placed before 11:00 a.m. Free use of MasterCard and Visa. COD's accepted. Personal checks require 2 weeks clearance. Manufacturer's warranty included on all equipment. Prices subject to revision.

Call For Free Catalog:

1-800-854-8275

CA, AK, HI (714) 630-3322

Red Baron COMPUTER PRODUCTS

1100 N. TUSTIN
ANAHEIM, CA 92806

CIRCLE 203 ON READER SERVICE CARD

©1982 Red Baron Computer Products

creative computing software evaluation

Pilot for the Apple

Mike Smith

creative computing
SOFTWARE PROFILE

Name: Apple Pilot

Type: CAI Authoring and Playback

System: Apple II Plus, 48K, Disk Drive (two drives required for authoring)

Format: Machine Language

Summary: Extensive, colorful and interesting

Price: $150.

Manufacturer:
Apple Computer Inc.
10260 Bandley Dr.
Cupertino, CA 94017

In the development of lessons for Computer Assisted Instruction (C.A.I.), the number of things that the instructor needs to do, most of the time, is limited. The three major things are

- Inform the student,
- Accept his response to that information,
- Move to a different part of the lesson depending on whether the student reacted in an expected or an unexpected way.

Everything else is mere "computational detail" and should be performed by the computer.

Now that is rather idealistic. Authoring languages, of which Pilot is an example, attempt to allow the person unfamiliar with those computational details to develop useful and sophisticated courseware for use in the classroom. In addition, such languages can be used to advantage by the person familiar with computers and offer the ability to develop graphics or sound effects to be used in conjunction with programs not written with the authoring language.

The authoring languages on the market achieve the removal of the computational details with varying degrees of success. This review deals with the Apple implementation of Pilot. Although many of the comments are specific to advantages/disadvantages of *Apple Pilot*, I hope that people interested in purchasing other versions, e.g. PET or Atari Pilot, will be helped by knowing what one person feels should be in a Pilot implementation.

The Apple paddles can be used in developing graphics.

In the upcoming issues of *Creative Computing*, I will present an implementation of Pilot that converts Pilot statements into Basic commands. I am very familiar with the language, and therefore feel justified in making certain criticisms of *Apple Pilot*.

I have spent four years as a junior/senior high school teacher in physics and mathematics, and am currently teaching courses in computer engineering at the university level. I am interested in the development of Computer Aided Instruction and in the simulation of various effects in the classroom. My interest in Pilot arose when I found that in order to develop Basic lessons for use in the classroom, I had to spend an exorbitant amount of time.

This development time was in addition to my regular classroom load, and although I had been a programmer for 15 years, I was looking for a method to cut down lesson development time. *Apple Pilot* appeared to be a step in that direction.

Equipment

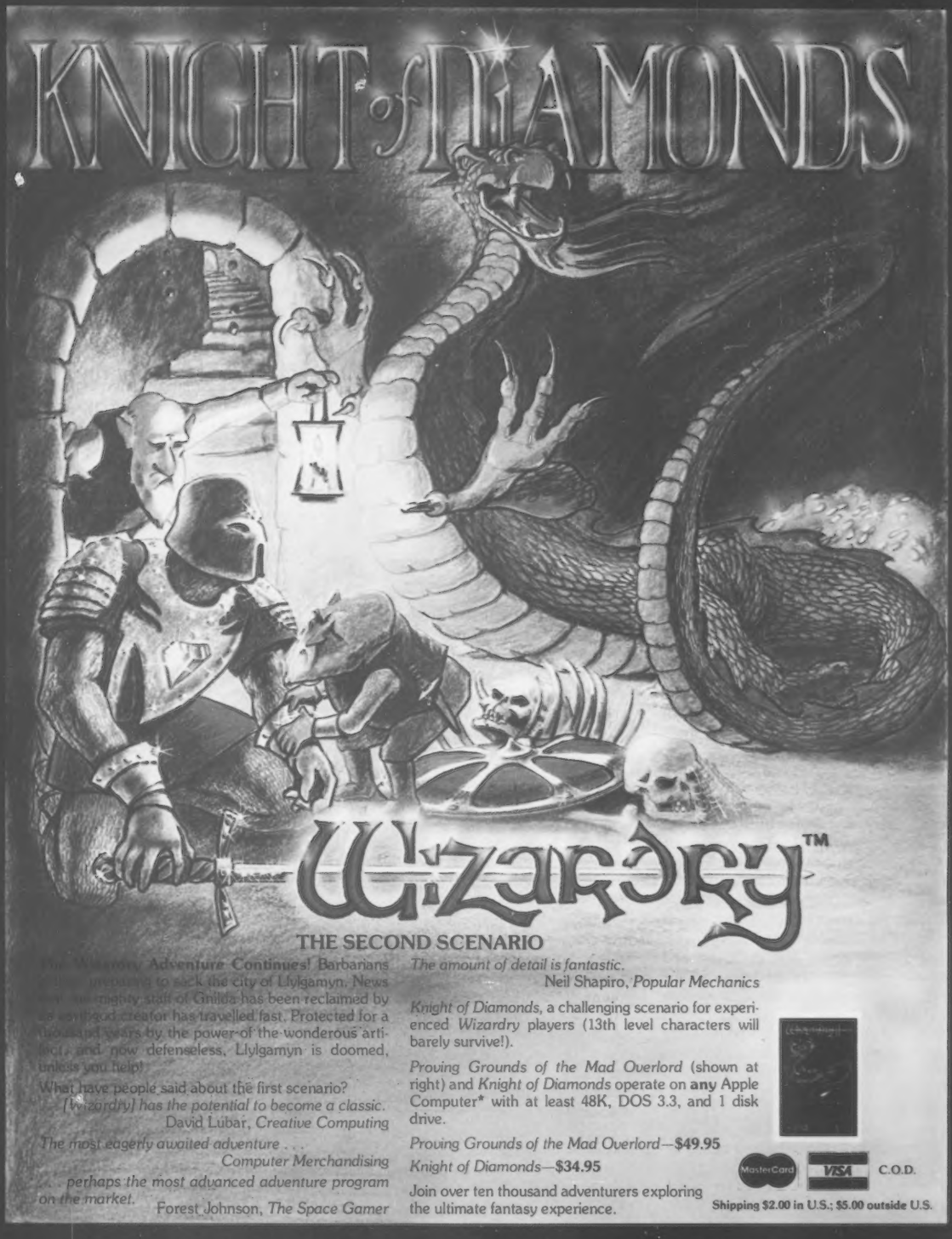
Apple Pilot comes as a system diskette (uncopyable but with a back-up), a demonstration lesson diskette and two fairly detailed *Apple Pilot* reference books. A student using prepared lessons requires an Apple II Plus with 48K of memory together with a single disk drive. Although not necessary, a color monitor can be used to good effect to display the graphics.

A teacher (lesson author) needs a second disk drive to prepare a lesson. There has been no effort made to enable the teacher with only one drive to develop a lesson. As *Apple Pilot* makes very extensive use of the disk drives, this disadvantage can be a blessing in disguise.

The Apple paddles can be used in developing graphics and to allow the student to interact with the program. However, as all the graphics commands can be implemented from the keyboard, the absence of paddles is not a problem.

A printer can be used to provide a listing of the Pilot program during lesson develop-

Dr. Mike Smith, 304 86th Avenue SE, Calgary, Alberta, Canada T2H 1N7.



THE SECOND SCENARIO

The Wizardry Adventure Continues! Barbarians have invaded to sack the city of Llylgamyn. News of the mighty staff of Gnilda has been reclaimed by its rightful creator has travelled fast. Protected for a thousand years by the power of the wonderous artifact, and now defenseless, Llylgamyn is doomed, unless you help!

What have people said about the first scenario?

[Wizardry] has the potential to become a classic.
David Lubar, *Creative Computing*

The most eagerly awaited adventure . . .
Computer Merchandising

. . . perhaps the most advanced adventure program on the market.
Forest Johnson, *The Space Gamer*

The amount of detail is fantastic.
Neil Shapiro, *Popular Mechanics*

Knight of Diamonds, a challenging scenario for experienced *Wizardry* players (13th level characters will barely survive!).

Proving Grounds of the Mad Overlord (shown at right) and *Knight of Diamonds* operate on **any** Apple Computer* with at least 48K, DOS 3.3, and 1 disk drive.

Proving Grounds of the Mad Overlord—**$49.95**

Knight of Diamonds—**$34.95**

Join over ten thousand adventurers exploring the ultimate fantasy experience.

MasterCard VISA C.O.D.

Shipping $2.00 in U.S.; $5.00 outside U.S.

NOW AVAILABLE AT YOUR LOCAL COMPUTER AND HOBBY STORE

*APPLE IS A REGISTERED TRADEMARK OF APPLE COMPUTER, INC.

Sir-tech SOFTWARE, INC.
6 MAIN STREET, OGDENSBURG, N.Y. 13669
(315) 393-6633

CIRCLE 237 ON READER SERVICE CARD

ment. Unfortunately, there are no commands to allow a Pilot lesson to use a printer. This is a definite disadvantage as there are many times when students need hard copy information.

Through the use of the graphics screen, both upper and lower case are provided without a lower case adapter. Control-Z acts as a shift key, and Control-A acts as a shift-lock key. The shift key appears not to be implemented. However, connecting the shift key to the game paddle port allows normal typewriter use of the shift key. Shift-p gives P and control-shift-p gives @. No mention of this possibility is made in the manual; it is almost as if the Apple programmers didn't realize that they had included it.

No changes to the files on the Apple diskette are needed to get this modification to work. (Don't try this yourself unless you know eactly what you are doing. Get the dealer to do it so you can use the shift key, keep the use of the game paddles and avoid baked Apple.)

Although the *Apple Pilot* is implemented in part from Apple Pascal, neither knowledge of Pascal nor the Pascal language card is required to use it. However, if you do have access to a language system, you will find that you can perform many functions using the Pascal operating system. With the language system you can use *Apple Pilot* to advantage in customizing character sets, e.g. scientific or foreign language, for use in place of the Pascal SYSTEM.CHAR.

The fact that the *Apple Pilot* makes no use of the language card has both advantages and disadvantages. The most obvious advantage is that you cut the cost of implementing an *Apple Pilot* system by $300 or so per student computer. That is quite a saving on a classroom set of computers.

The major disadvantage is that *Apple Pilot* is rather cramped for memory space. This results in heavy disk drive use and very little space to store variables within a Pilot program. It would be nice if the teacher could at least down load the EDITORs onto the card as this would reduce the time required to reload them to make corrections in the programs.

It is rather annoying that the system diskette is uncopyable. The lesson diskettes can easily be copied. If only the teacher is developing lessons using the system diskette, there is little likelihood of crashing the system diskette, as *Apple Pilot* is written in a very user helpful and protective way.

However, Pilot is such a simple language to learn and the Apple implementation of the sound and graphics editors so pleasant to use, that students should be allowed to develop their own programs. Students are frequently very hard on disks and a copyable master disk should be available.

The Pilot System

The *Apple Pilot* system is divided into six parts. The text editor, graphics editor, character editor, sound editor, and lesson duplicator are available only to the courseware developer. The Run-Time system is available to both student and developer.

Developing a Lesson

After booting the system (authoring) disk, the teacher is presented with a menu of editors. After choosing the required editor, a second menu appears. This allows the various types of files to be created,

deleted, printed, edited or tested. A maximum of 21 files can be accessed by each of the editors. This might appear to be a serious limitation, but in practice, except for a back-up disk, you would not want a large number of lessons on one disk.

An important part of developing a Pilot lesson is designing the lesson on paper before entering the text. The sound and graphics parts of the lesson need not be developed until later; the Run-Time system is able to cope with the absence of these files. This means that the teacher can map out the skeleton of the lesson without worrying about embellishments until much later on.

One big plus with this version of Pilot, is that the courseware developer does not have to be concerned with the formatting of the text on the screen. In Basic programs, you must be sure that words are not split onto two lines. In *Apple Pilot* this is automatically taken care of. Even if you develop a lesson and then decide to cram the text into one half of a screen, using the other half for graphics, all the formatting is done for you.

Once the lesson has been saved on the disk, you can RUN it from the editor. Running the lesson this way has several advantages over testing the program as though you were a student. A student never gets to see the error messages as the Run-Time system inwardly digests them. Running the program from the editor causes all errors to be displayed on the screen. In addition you can more quickly edit the files by recalling the editor into memory at this time. It is a shame that the editors cannot be stored in the language card as this would further reduce the recall time.

In Basic, when your program crashes, you simply retype the offending line and rerun the program. This version of Pilot is a little different. The Pilot program, unlike a Basic program, does not exist in memory. Instead, it resides as a series of commands in a file on the disk. The Run-Time system pulls small portions off the disk and does what is required. This means that you can't just change a line, you must go back and change the file on the disk using the editor. This is the reason that it makes good sense to plan your lessons in advance.

In developing a lesson, you can include a GOTO option which allows you to jump to a certain part of a lesson and test it without having to go through the earlier parts. The secret in good CAI is to test, test and then test again.

Text Editor

Apple Pilot has a fairly comprehensive editor. It allows the addition and deletion of text, moving around inside the file and the replacement or changing of specific character strings. For people unfamiliar with editors or computers, it will take some time to get used to all the commands.

A nice feature is that after making a change, you can type Control-C and recover the original file—useful when you make mistakes. In addition, before you leave the editor, you are asked how you want to save the file. You can save it under either the old name or a new name, or throw it away.

The use of the command tx: allows the character set to be changed. This means that the keyboard can be programmed to type special characters instead of the normal letters. This is very useful for introducing scientific or foreign language symbols into your lessons. However, since the text editor uses the text screen rather than the graphics screen, these new characters are not displayed while you are in the text editor. This is a great shame as it makes animation much more difficult.

Again, because the text editor uses the text screen, all letters are shown in upper case, with the true upper-case letters shown in inverse. The shift key modification mentioned earlier still works. No information on how to incorporate a lower-case adapter is available in the documentation.

If many back-up copies of files are kept, you will quickly have more than 21 text files on a disk. Because of a peculiarity of the editor, you can access only the first 21 access files. The others are safe on the disk, you just can't edit them. If you find yourself in this situation, there are three possible solutions:

Delete unwanted files. A useful solution only if the files are unwanted. A better solution is to have one disk on which you

HEATH/ZENITH & YOU... ONE STRONG PARTNERSHIP.

Buying a computer is only the beginning of a long-term partnership between you and the people from whom you buy. Your ongoing need for software, peripherals and accessories requires a partner who will stand by you. With a growing line of products to meet your needs with professional service and support, Heath/Zenith is that strong partner. Look at what we have to offer:

THE ALL-IN-ONE COMPUTER – The heart of the Heath/Zenith line is the stand-alone *89 Computer.* It's a complete system with built-in 5.25-inch floppy disk drive, professional keyboard and keypad, smart video terminal, two Z-80 microprocessors and three RS-232C Serial I/O Ports. It comes with 48K bytes of RAM, expandable to 64K.

PERIPHERALS AND ACCESSORIES – These include the popular *Heath/Zenith 19 Smart Video* Terminal, loaded with professional features. We also offer color and black and white monitors, modems, computer language courses, and high-speed typewriter-quality printers.

SOFTWARE – Our complete library of software includes the SuperCalc Spreadsheet and Condor Data Base Management System. *Word processing,* includes three different programs. *Small Business Programs* feature Peachtree's P5 Series, General Ledger and Inventory Control. *HUG, Heath Users' Group,* offers members a library of over 500 low-cost programs for home, work or play.

PROGRAMMING LANGUAGES – To write your own programs, Microsoft BASIC (compiler and interpreter), FORTRAN and COBOL Languages are available.

APPLICATIONS SOFTWARE – Expand the performance range of your computer with a broad selection of software, including the best of *Digital Research and Micropro* – as well as the complete line of *Softstuff*™ products.

OPERATING SYSTEMS – Three versatile systems give you the capability to perform your specific tasks. *CP/M by Digital Research* makes your system compatible with thousands of popular CP/M programs. *UCSD P-System with Pascal* is a complete program development and execution environment. And *HDOS, Heath Disk Operating System* gives you a sophisticated flexible environment for program construction, storage and editing.

DISK SYSTEMS – *The new Heath/Zenith 67 Winchester Disk System,* for commercial use, adds nearly 11 megabytes of storage to your 89 computer. It includes an 8-inch floppy disk drive for data portability. *The new 5.25-inch 37 disk system,* available with 1 or 2 drives, adds up to 1.28 megabytes of storage. Both plug-in systems have write protection.

SERVICE AND SUPPORT – Prompt and professional service and assistance is available nationally through Heathkit Electronic Centers, Zenith Data Systems for commercial users or through Heath factory servicing and phone-in technical assistance.

Complete, integrated computer hardware and software, designed to serve and grow with you – that's what to look for in a strong partner. And with Heath/Zenith, you get it all.

Heath/Zenith computer products are sold nationwide through Heathkit Electronic Centers* (check your white pages for locations). For a FREE colorful full-line catalog, write: Heath Co., Dept. 355-914, Benton Harbor, MI 49022.

HEATH/ZENITH

Your strong partner

Product specifications are subject to change without notice.
Heath Company and Veritechnology Electronics Corporation are wholly-owned subsidiaries of Zenith Radio Corporation
*Heathkit Electronic Centers are operated by Veritechnology Electronics Corporation

CP-210R1

THEY LAUGHED AT ME WHEN I SAT DOWN AT THE KEYBOARD . . .
BUT OH, WHEN I BEGAN TO PLAY! ***HERE'S WHAT THEY SAID:***

BPL-ATON I—"I've had to replace three electro-universal wristcouplers since I got it."

PROTECTOR.

CORGUS I—"Even with a class II embryonic neurolifter, it is disgustingly difficult to play."

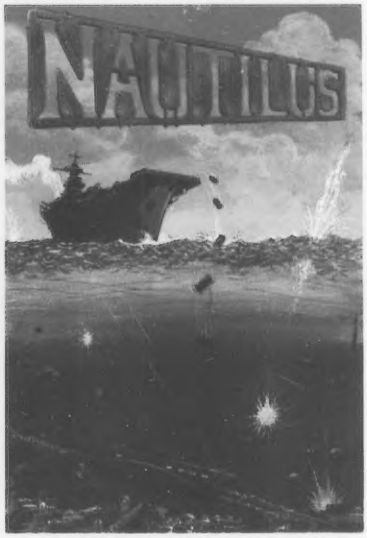
SLIME.

ADM-MARK II+—"More fun than kicking the servonic katdroid."

CHICKEN.

ELF-X2—"Can I be a submarine when I grow up?"

NAUTILUS.



NAUTILUS, PROTECTOR, CHICKEN AND SLIME ARE ALL TRADEMARKS OF SYNAPSE SOFTWARE.

synapse SOFTWARE

820 Coventry Rd.
Kensington, CA 94707
(415) 527-7751

FOR THE ATARI* HOME COMPUTER.

*ATARI IS A REGISTERED TRADEMARK OF ATARI, INC.

CIRCLE 250 ON READER SERVICE CARD

develop a lesson. Then you can transfer the completed lesson. (But when is a lesson ever complete?)

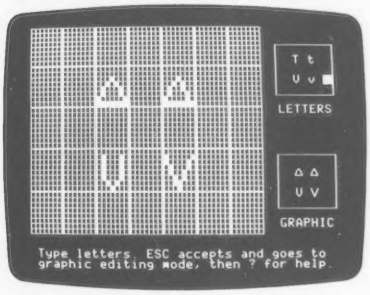
Call early versions of the files into memory and save them under a different name, then delete the old files. This has the effect of putting early files high on the disk. The other files move down the disk into a place where you can access them. This is a useful procedure only if you do it infrequently.

Access the files through a Pascal language card. Users of the language card will recognize the text editor as being similar to the Pascal Text Editor, except in two areas. First, the screen is limited to 40 characters. If you go past 40 characters, the cursor automatically moves down to the next line. That might be a useful option in Pascal. Second, the function of the Control-C and Escape keys in accepting/rejecting text changes are reversed in operation in Pilot compared to Pascal. Whether it is possible to change the Pilot start-up options to alter this is not documented.

Character Editor

The character editor allows the design of special characters.

Upon entering the editor, you will find a screen divided into three areas: a grid of 35 boxes show the character you type on the keyboard and the real-size special character you have developed.



To design a character, you move the cursor around on the grid, using either the keyboard or paddles. Each small grid square represents one pixel of the character.

The character editor was found to be lacking in one area. There is no simple way of "pulling the plug"—erasing a character back to a blank. If you make a mistake, you must erase it dot by dot.

Graphics Editor

Graphics can be entered into a lesson in two ways. They can be called by graphics commands imbedded in the text or as pictures developed by the graphics editor. For graphics more complex than a few simple lines, it is better to use the editor. The other method means that you don't see the effects of the graphics until you run the lesson.

For complex graphics, correcting errors can become very time-consuming. Second, when the lesson is run every time a graphics command is issued, a graphics interpreter is downloaded from the disk into the memory (another place where a language card could be used to advantage). If many graphics commands are entered, this can really slow down the lesson.

The editor itself allows the production of complex figures in a fairly simple way. Once you are familiar with the commands and have developed a plan of attack, the pictures appear very quickly. I like to use the editor to develop "slides" for use in lessons and lectures. A HELP function is included to provide information on-line about the commands.

The editor uses a rubber band cursor. The cursor is placed at a starting part of the screen from which it can be moved by using the paddles and/or keyboard. Connecting the starting point and current cursor position there is a line which stretches and shrinks as the cursor is moved. It is as though there were a rubber band connecting the starting and current points of the cursor. This makes it very easy to position your graphics correctly.

The editor uses a rubber band cursor.

Boxes can be placed on the screen very quickly. Using the rubber band cursor you position the opposite corners of the box, press B and get a box filled with the required color. Pressing F gets you a frame rather than a filled box. Open and closed circles can be produced in a similar way.

Complex shapes can be made by moving the cursor about the screen. Moving the cursor into the middle of a shape and typing A will cause an area to be filled with color.

Typing E causes the last set of graphics commands to be removed and the graphics screen updated. This updating of the graphics should be an option. If you want to remove the last two sets of commands, you must remove one set, wait for the screen to be redrawn, and then erase the second set and wait again. For complex graphics this wait can be very frustrating.

Commands can only be erased from the end back. If you find that something you drew early in the graphic is no longer to your liking, everything drawn after it must go.

Moving the cursor to a point and typing T allows the entry of text on the graphics screen. This is independent of the text placed in the text window by the text editor commands.

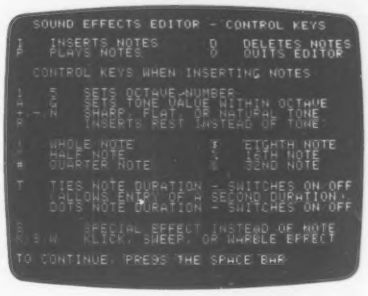
The graphics, once produced, can be stored in two ways. A picture can be stored as a series of commands or as the whole picture (Quick Draw). When the command form is called from a lesson, the picture is redrawn element by element. With a Quick Draw picture, the whole picture appears on the screen at once. The main disadvantage of Quick Draw pictures is the fact that they eat up disk space very quickly, occupying 17-20 blocks on the disk compared to the 1-4 blocks that the command files occupy.

The main problems with the graphics editor are the erasing problem and the fact that there is no way to use a graphics tablet to draw the graphics. I have found a reasonable, although unsatisfactory compromise. I make a drawing of the object on a clear piece of plastic. I then place this in front of the monitor and use the paddles to trace the shape on the screen. It works, but a graphics tablet would be much nicer.

Sound Editor

Sound can be introduced into a lesson by using either sound commands imbedded in the text or the sound editor. Imbedded commands suffer from all the disadvantages mentioned for imbedded graphics commands.

The sound editor has a HELP function to detail the commands available. It permits notes to be produced over a range of four octaves (plus an additional F). Notes can be natural, sharp or flat. The duration of the notes can be changed from a full note down to 1/32, and notes can be tied. Special effects include the production clicks, sweeps or warbles. You can play the music developed from the editor without running a lesson.


SOUND EFFECTS EDITOR - CONTROL KEYS
I INSERTS NOTES
P PLAYS NOTES
D DELETES NOTES
Q QUITS EDITOR
CONTROL KEYS WHEN INSERTING NOTES
1 - 5 SETS OCTAVE NUMBER
A - G SETS TONE VALUE WITHIN OCTAVE
+ - = SHARP, FLAT OR NATURAL TONE
R INSERTS REST INSTEAD OF TONE
1 WHOLE NOTE
2 HALF NOTE
4 QUARTER NOTE
8 EIGHTH NOTE
6 16TH NOTE
3 32ND NOTE
T TIES NOTE DURATION - SWITCHES ON/OFF
ALLOWS ENTRY OF A SECOND DURATION
DOTS NOTE DURATION - SWITCHES ON/OFF
S SPECIAL EFFECT INSTEAD OF NOTE
K, S OR W CLICK, SWEEP, OR WARBLE EFFECT
TO CONTINUE, PRESS THE SPACE BAR

As a science/math teacher, I have not had much need to use this editor other than to produce a few special effects. Whether the editor would be useful in producing lessons for somebody with a more musical bent, I am not qualified to

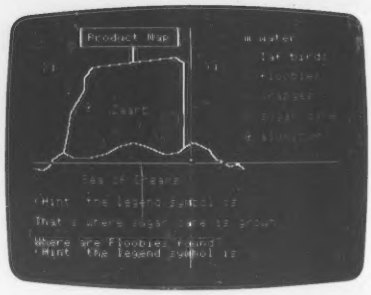
say. However, the following limitations might be important:

The notes are not displayed on the staves but in the form

C 4 1/4 T

which means the note of C in the fourth octave for 1/4 of a note, tied to another note.

You are limited to one note at a time; no chords are allowed. This is rather a shame as even in science it would be nice to demonstrate the effect of two notes beating together.



Features of Apple Pilot

In my upcoming series of tutorials and articles, I will describe the Pilot language. *Apple Pilot* has the equivalent of most of the commands mentioned in those articles. The rest of this review will be devoted to describing the special features of *Apple Pilot*.

The presence of the graphics editor is a real plus. Graphics and special characters can add to the content and interest of a lesson, if used correctly. The documentation provided on Pilot is good. Examples are plentiful and a person unacquainted with the language can prepare satisfactory lessons with the documentation. However, there are no additional references which would enable users to extend their knowledge and application skills.

The Accept and Match commands have several useful options. The student answer can be modified automatically to all upper and lower case. Unnecessary blanks can be removed and numbers rescued from within a sentence. For example, the number 5 will be recognized from within "There are 5 things there, computer."

The Match instruction can be made to look for one or several character strings with or without allowing for spelling mistakes. It can be made to distinguish between the "no" in "none" and the "no" in "known" (one starts the word). The number of attempts that a student has made at a certain answer is stored automatically by the program.

In addition, it is possible to preset the time allowed for a student to answer. This permits checking on whether the student needs some help.

A very useful command, ap:, places a series of cross hairs on the screen. The student can move the cross hairs with the paddles to point things out. This feature is nicely demonstrated in the Legends program on the demonstration Lesson diskette. However, if you don't have the paddles connected, you will not see the demonstration.

There are file handling commands included in *Apple Pilot* which can be used to store student responses and scores for later analysis. I have not made much use of these, as I felt that they were rather clumsy. If you were building a large series of lessons and needed to keep track of overall student performance they might be useful.

Because of memory restrictions, there is only limited space for storing variables in the program (600 characters including the answer buffer). The names of the variables are limited to one letter and one number. This means that the student name must be stored in a variable of the form N1$ rather than NAME$. This leads to poor programming style.

Your local dealer will know very little about Pilot.

Assuming that the system needs variables of two characters only, there was no need to restrict the user to those characters. A look-up table would have provided the best of both worlds.

In addition to strings, numerical variables can be manipulated. A number of system variables are kept. These include the last answer, the numerical value of the last answer and the number of times the last question has been attempted. Variables defined in one Pilot lesson can be carried over into the next lesson if required. This is a very useful feature to ensure continuity in a series of lessons.

A very useful compute command, c:, allows mathematical formulae to be calculated. Certain string modifications can be made, including capitalization of a string, capitalization of the first letter, replacement or deletion of characters in a string. Surprisingly, changing a string into lower case is not an allowed function. The calculation power of the Compute function seems rather slow. The production of random numbers for use in a simulation seems to take forever.

In addition, calculations cannot be done via the equivalent of DO-loops. This is probably not a problem for people unfamiliar with computers, but for experienced programmers it is definitely a fustrating disadvantage. IF-THEN loops can be produced but also take a long time to run.

Considering the fact that there are so many user friendly features in this version of Pilot, it is very surprising that it is necessary to define strings before they can be used. Again, this is probably due to memory space restrictions.

The program does its best to recover from errors. If a graphics or sound file is not available, the student lesson continues regardless. The program responds to control-C, reset and fatal errors by rebooting the system HELLO program. There is no way of disabling this feature.

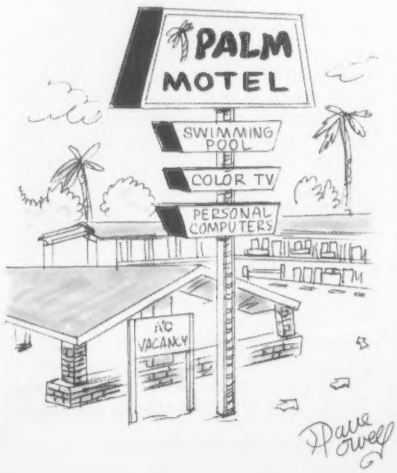
Conclusion

Overall, this is a useful program and can be put to good use by both the experienced and inexperienced courseware developer. There are many useful HELP functions within Pilot, and the program is, in general, very user friendly. Considering the cramped memory, a teacher will be limited by his own imagination, rather than by this implementation of Pilot.

My only real criticisms concern support and documentation. There are no additional references on Pilot and no information at all for the experienced programmer who wants to include parts of Pilot with his lessons to make modifications to the language.

Your local dealer will know very little about Pilot and letters to Apple requesting more information will not even receive a courtesy postcard to say "contact your local dealer and stop bothering us."

Your best bet is to form a group of Pilot users, and share software. And please, if you have useful ideas, write them up and send them to *Creative Computing* so we can all share. Everybody hates re-inventing the wheel. □



DISCOUNT DATA PRODUCTS

FOR THE BEST SERVICE
AND PRICE YOUR $ CAN BUY

30% DISCOUNT ‡ MONTHLY SPECIALS

GAMES★ UTILITIES ★ BUSINESS

APPLE		LIST PRICE	OUR PRICE
★ ADVENTURE INTERNATIONAL			
★ APPLIED SOFTWARE			
★ ASTAR INTERNATIONAL COMPANY			
★ ASHTON TATE			
ARTSCI			
Magic Window	D	99.95	79.95
★ AUTOMATED SIMULATIONS			
★ AVALON HILL GAME COMPANY			
AVANT-GARDE CREATIONS			
Hi-Res Secrets	D	125.95	99.95
BEAGLE BROTHERS			
DOS Boss	D	24.00	19.95
Utility City	D	29.50	23.95
Alpha Plot	D	39.50	31.95
★ BEZ			
BRODERBUND SOFTWARE			
Alien Reign	D	24.95	19.95
Star Blazer	D	31.95	**22.35‡**
Space Quarks	D	29.95	23.95
David's Midnight Magic	D	34.95	27.95
Arcade Machine	D	44.95	35.95
Alien Typhoon	D	24.95	19.95
Apple Panic	D	29.95	23.45
BUDGECO			
Raster Blaster	D	29.95	23.95
CALIFORNIA PACIFIC			
Space Album	D	39.95	31.95
3D Graphics	D	39.95	**27.95‡**
CAVALIER COMPUTER			
Aster Field	D	24.95	19.95
Bug Attack	D	29.95	23.95
Micro Wave	D	34.95	27.95
Star Thief	D	29.95	23.95
★ CONTEXT ★ C.P.U.			
★ CONTINENTAL SOFTWARE			
DAKIN 5/LEVEL 10			
Programming Aids	D	90.00	71.95
DATAMOST			
County Fair	D	29.95	23.95
Thief	D	29.95	23.95
Casino	D	39.95	**27.95‡**
Swashbuckler	D	34.95	27.95
Snak Attack	D	29.95	23.95
★ DATASOFT ★ DELTA SOFTWARE			
★ DENVER SOFTWARE			
★ EDU-WARE			
GEBELLI SOFTWARE			
Horizon V	D	34.95	27.95
HAYDEN SOFTWARE			
Sargon II	D	34.95	27.95
Reversal	D	34.95	27.95
★ HIGHLANDS COMPUTER SERVICES			
★HOWARD SOFTWARE			
INNOVATIVE DESIGN SOFTWARE			
Pool 1.5	D	34.95	27.95
Trick Shot	D	39.95	31.95
INFOCOM			
Zork I	D	39.95	31.95
Zork II	D	39.95	31.95
I.S.M.			
Mathemagic	D	89.95	71.95
INSOFT			
Graforth II	D	95.00	75.95
★ ISA ★ LAZER SYSTEMS ★ IUS			
★ LJK ENTERPRISES ★ MICRO LAB			
★ MICRO PRO INTERNATIONAL			
MICROSOFT			
TASC Compiler	D	175.00	139.95
A.L.D.S.	D	125.00	99.95
Olympic Decathlon	D	29.95	23.95
Typing Tutor II	D	24.95	19.95
★ MICROSOFTWARE SYSTEMS ★ M&R			
MUSE			
Robot War	D	39.95	31.95
Castle Wolfenstein	D	29.95	23.95
ON-LINE SYSTEMS			
Ultima II	D	54.95	43.95
Frogger	D	34.95	27.95
E.P.F.	D	79.95	63.95
Wizard & Princess	D	32.95	26.35
Cranston Manor	D	34.95	27.95
Screen Writer II	D	129.95	99.95
#4 Ulysess & Golden Fleece	D	34.95	27.95
Expeditor II AppleSoft Com	D	99.95	79.95
Jawbreaker	D	29.95	23.95
Road Work	D	34.95	27.95
Marauder	D	34.95	27.95
Time Zone	D	99.95	79.95
Missle Defense	D	29.95	23.95
Threshold	D	39.95	31.95
PERSONAL BUSINESS SYSTEM			
Exec. Secretary	D	250.00	**174.95‡**
PICCADILLY			
Falcons	D	29.95	23.95
Suicide	D	29.95	**20.65‡**
Star Blaster	D	29.95	23.95
Ribbit	D	29.95	23.95
★ PROFESSIONAL SOFTWARE			
★ PHOENIX SOFTWARE			
★ QUALITY SOFTWARE			
★ RIVERBANK SOFTWARE			
SENSIBLE SOFTWARE			
Super Disk Copy III	D	30.00	23.95
Multi Disk Cata III	D	25.00	19.95
Disk Recovery	D	30.00	23.95
Applesoft-Plus	D	25.00	19.95
Applesoft Pro. Opt	D	20.00	15.95
Disk Org. II	D	30.00	23.95
DOS Plus	D	25.00	19.95
Quickloader	D	25.00	19.95
Apple Speller	D	75.00	**52.50‡**
Image Printer	D	40.00	31.95
SENTIENT SOFTWARE			
Oo-TOPOS	D	32.95	25.95
★ SIERRA SOFTWARE			
SIRIUS SOFTWARE			
Foosball	D	29.95	**20.95‡**
Twerps	D	29.95	23.95
Snake Byte	D	29.95	23.95
Audex	D	29.95	23.95
Sneakers	D	29.95	23.95
Epoch	D	34.95	27.95
Outpost	D	29.95	23.95
Beer Run	D	29.95	23.95
Borg	D	29.95	23.95
Hadron	D	34.95	27.95
Joyport	A	74.95	59.95
Gorgon	D	39.95	31.95
Epoch	D	34.95	27.95
Mentaur	D	34.95	27.95
SIR-TECH SOFTWARE			
Wizardy	D	49.95	39.95
Knight of Diamonds	D	34.95	27.95
★ SOFTAPE ★ SOFTWARE EMPORIUM			
SOFTWARE PUBLISHING CORP.			
PFS	D	125.00	99.95
PFS Report	D	95.00	71.95
SOUTHEASTERN			
Data Capture	D	64.95	52.95
Superterm 80 col.	D	90.00	69.96
Smart Term 80 col.	D	90.00	69.95
SOUTHWESTERN DATA SYSTEMS			
Ascii Pro	D	129.95	103.95
Doubletime Printer	D	149.95	119.95
Financial Mngmnt Sys II	D	59.95	47.95
Listmaster	D	39.95	31.95
Merlin	D	64.95	51.95
The Routine Machine	D	64.95	51.95
Speed Star	D	134.95	107.95
Z-Term "The Pro"	D	150.00	**104.95‡**
STONEWARE PRODUCTS			
D.B. Master	D	229.00	182.95
D.B. Mas. Utly Pak I	D	99.00	79.95
D.B. Mas. Utly Pak 2	D	99.00	79.95
D.B. Master Stat Pak	D	99.00	79.95
★ STRATEGIC SIMULATIONS			
★ SUBLOGIC			
★ SYNERGISTIC SOFTWARE			
TG PRODUCTS			
Game Paddles	A	39.95	31.95
Joystick	A	59.95	**41.95‡**
Select A Port	A	59.95	47.95
TURNKEY SOFTWARE			
The Gauntlet	D	34.95	27.95
Amoeba Man	D	34.95	**24.45‡**
UNITED SOFTWARE OF AMERICA			
3-D supergraphics	D	39.95	31.95
Super KRAM	D	175.00	139.95
Conquest	D	225.00	**157.50‡**
VISICORP			
Visitread/Plot	D	300.00	**209.95‡**
Visicalc	D	250.00	**169.95‡**
Visifile	D	250.00	**169.95‡**
VERSA COMPUTING			
VersaWrit Exp Pac-1	D	39.95	32.95
EZ Port	D	24.95	20.95
Versawrit Expl. Pac II	D	39.95	31.95
★ VIDEX INC. ★ VOYAGER SOFTWARE			

LARGE SELECTION OF ATARI AND TRS 80 SOFTWARE

CALL TOLL FREE 1-800-854-2914 (FOR PLACING ORDERS OUTSIDE CALIFORNIA)

FOR INSIDE CALIFORNIA AND OTHER INQUIRIES CALL 1-714-287-0190

★ SEND FOR OUR PRICE SHEET FOR SPECIFIC PROGRAMS AND PRICES • CALL FOR WEEKLY SPECIALS
PLEASE CHECK FOR SYSTEM REQUIREMENTS BEFORE ORDERING. INCLUDE PUBLISHER AND PRODUCT NAME
FOREIGN INQUIRIES INVITED — ADD 10% SHIPPING

All Orders Prepaid by Personal Check, Money Order, Cashier Check. For Faster Delivery Service C.O.D. — Master Charge — Visa

Mastercharge — Visa add 3%, and include expiration date on card.
Please Add $2.50 for Shipping.

California Residents Add 6% Sales Tax
Prices Valid Through This Month's Issue.

Prices Subject to Change Without Notice
Please Specify Tape or Disk.

DISCOUNT DATA PRODUCTS • P.O. BOX 19674-CG• SAN DIEGO, CALIFORNIA 92119

CIRCLE 151 ON READER SERVICE CARD

The Case Against Pilot:

The Pros and Cons of Computer-Assisted Instruction Languages and Authoring Systems

Paul F. Merrill

The advent of low-cost microcomputers has created a new surge of interest in educational applications in the computer. This new interest is creating a growing demand for quality computer-assisted instruction (CAI) courseware. Most microcomputers which have been introduced in the last few years come with Basic, a general purpose language. Although Basic is considered to be a beginner's language, many feel that it is impractical to expect teachers, with no computer experience, to learn Basic in order to develop CAI courseware.

Since the advent of CAI many individuals and organizations have attempted to develop specialized computer languages which would enable instructors with little computer background to develop CAI courseware. These attempts have fostered such CAI languages as Coursewriter, Planit, Tutor and Pilot.

In an effort to get even further away from computer languages, others have developed authoring systems such as Ticcit and Bell and Howell's recently introduced Courseware Development System for microcomputers.

These authoring systems may be distinguished from CAI languages by their lack of operation or command statements and their use of built-in logic and presentation forms or files. Rather than putting together a series of commands, the author fills in presentation forms such as rules, questions, examples, possible answers, feedback, helps, etc.

CAI languages and authoring systems may simplify the author's task by using one or more of the following techniques: 1) Reduce the domain of possible commands and strategies; 2) Provide commands and strategies which meet the specific needs of instructional applications; 3) Provide commands or routines which perform higher level tasks. Most of the languages and systems mentioned above use a combination of these techniques. However, some languages emphasize one technique over another.

The simplicity of Pilot was achieved by reducing the number of commands in the language.

Dr. Paul Merrill, College of Education, Instructional Science Dept., W-160 STAD, Brigham Young University, Provo, UT 84602.

Pilot

One of the first special purpose CAI languages available for microcomputers was Pilot (Apple Computer Inc. recently announced Pilot for the Apple II). Pilot has gained popularity because it is relatively easy to learn and is designed specifically for educational applications.

The simplicity of Pilot was achieved by reducing the number of commands in the language. Most versions of the language have approximately ten commands. Some of the more powerful versions have several additional commands for graphics, tone generation, and special functions. The principle commands in Pilot include: Type, Accept, Match, Compute, Jump, and Use.

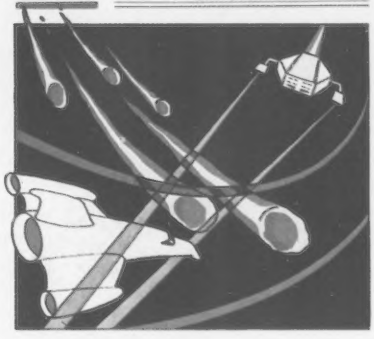
The Type command provides for the display of text and values of numeric and string variables on the screen. The Accept instruction causes the computer to pause and wait for the student to enter a response. The response is edited according to specified rules and stored in a system variable. The response may then be compared with possible correct and incorrect answers supplied by the author using the Match command.

The Compute command provides for the assignment of numeric and string values to variables and the evaluation of arithmetic expressions. The Jump instruction enables the sequence of command execution to be altered by branching to a specified

Great Games From Piccadilly Software Inc.

Piccadilly Software Presents

Star Blaster



Piccadilly Software Presents

Falcons

Piccadilly Software Presents

Warp Destroyer

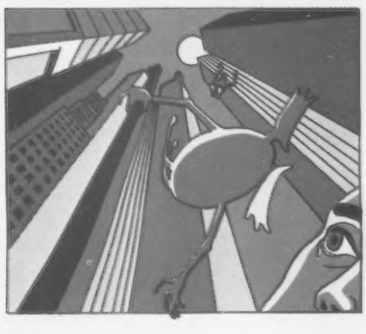
Piccadilly Software Presents

Survival

COMING IN THE 2ND HALF OF 1982

Piccadilly Software Presents

Suicide!



Piccadilly Software Presents

Ribbit

Available at your local dealer.

Requires: APPLE II/APPLE II PLUS with 48K in Dos 3.3 or 3.2 • APPLE III

Piccadilly Software Inc. • 89 Summit Avenue • Summit, N.J. 07901 • (201) 277-1020

*Apple is a registered trademark of Apple Computer Inc.

CIRCLE 215 ON READER SERVICE CARD

Welcome to the world of User/Frien

You don't have to know how to use a computer to use Micro Lab products. The programs are designed to be **error-trapped** and made to get the job done.

The Data Factory

An extremely easy-to-use system with enormous power and flexibility. Data storage on two disks is 225,000 bytes. Relocate records into a new data base; add, delete, or change field lengths anytime.

The Invoice Factory

Not just an invoice maker. It generates statements, aged receivable reports, product or customer reports, sales analyses. Use a new free form, automatic or standard invoice form.

Payroll-Manager

A whole department that doesn't write itself a check. Figures hours and makes all standard deductions plus seven optional deductions and writes the checks. Unbelievably fast, and easy to use.

Entertainment

Test your luck and skill with exciting games from Micro Fun.

Dogfight II
Crown of Arthain
Mad Venture
Painter Power
Roach Hotel
Peeping Tom
Palace in Thunderland
U.S. Constitution Tutor
English SAT I

Software that prompts you throughout the program.

dly Computing

Wall Streeter
This portfolio management program allows you to enter, by hand or modem, Friday's closing prices, Standard and Poor, Beta ratings, Value line timeliness and safety factors. Use standard formula or make up your own to project buys, sells and holds.

V Factory
Allows for a marriage between Data Factory and VisiCalc™ files. You can move data in either direction, manipulate it within the chosen program, and store it either way. An exciting tool for research and analysis.

Asset Manager
Both old and new tax laws are incorporated in this program which uses the straight line method for balance sheets and accelerated method for establishing asset values for amortization and prints tax schedules. 1,000 assets per taxpayer.

Data Manager III
A data base designed for the Apple III and can be used with floppies or hard disk drive. It will handle as many records as the storage media can handle with total flexibility.

Tax Manager
For producing federal income taxes and printing the schedules. This easy-to-use program includes the latest tax laws and will remain current with our Extended Warranty option.

Relocatable Linking Loader
Takes machine language routines that have been designated by an assembler as relocatable, links them together, and then establishes the program at an address the user specifies. Can be used with Language Plus.

V Blend
Allows users of VisiCalc™ to combine data in multiple VisiCalc™ files, merging the information into a new file.

Merger
A utility for the Data Factory and Invoice Factory. Merge data from fields in either program into those of another file.

Language Plus
A two volume library of machine language routines. These packages allow users, through Applesoft Basic, to speed up their performance in programming.

The Learning System
A company or educator may prepare a training/tutoring/testing device. Enter instruction or information; then key it to a tutorial drill or test to check for learning comprehension.

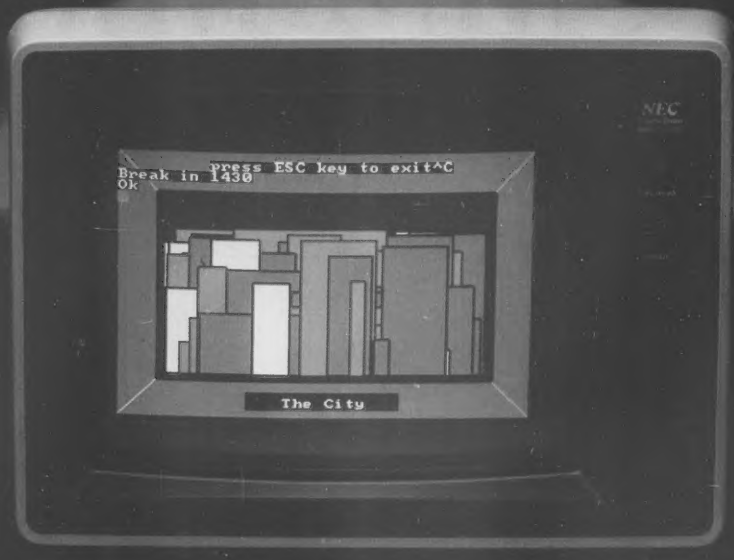
Apple and Applesoft are trademarks of Apple Computer, Inc. VisiCalc is a trademark of Personal Software.

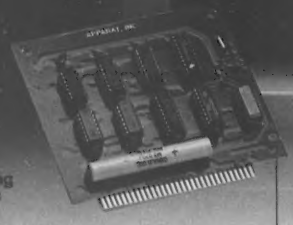
micro lab
systems that work

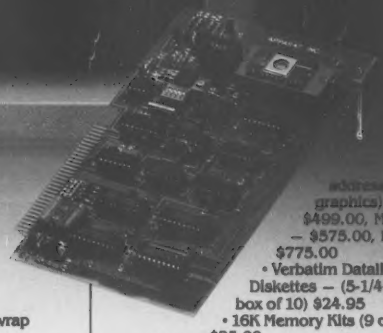
2310 Skokie Valley Road
Highland Park, IL 60035
312-433-7550

CIRCLE 184 ON READER SERVICE CARD

Look What Apparat has for your IBM Personal Computer.







The following add-ons are available immediately:

- 2 Dual Headed 40 Track Drives — (appears as four) 640K of storage, software patch, easy internal mount. $630.00
- Combo Card — Parallel printer, ASYNC communication (RS-232), and clock calendar functions, uses only one slot. $279.00
- 2 Single Headed 40 Track Drives — 320K of disk storage, easy internal mount. $450.00
- 48K additional RAM — 27 chips plug into master PC board $75.00
- Add-on Memory Card — (uses 64K dynamic RAM chips), 64K — $425.00, 128K — $525.00, 192K — $625.00, 256K — $725.00
- Prom Blaster — Programs most 1K to 4K EPROMS of 25XX and 27XX single or multivoltage, personality modules, read/write software. $149.00
- Apparat Game Diskette — $24.95
- Clock Calendar — Features seconds, minutes, hours, day of week, date, month and year, backup battery, leap year and crystal time base. $129.00
- Prototype Card — 3.5 by 8 inch wirewrap holds 150-14 pin dips. $29.95
- RGB Color Monitors — includes cable, 16 color modifications, NEC — $1,095.00, AMDEK — $899.00, TECO — $699.00.
- 3rd and 4th Add-on Drives — Expansion cabinet and IBM compatible drives, cabinet and 1 drive — $499.00, two drives — $749.00
- 64K Hardware Print-Spooler — Parallel printer adapter, buffers 13 minutes of output at 80 characters/second. $399.00.
- EPSON MX Printers — MX-80 (with dot addressable graphics) — $499.00, MX-80 F/T — $575.00, MX-100 — $775.00
- Verbatim Datalife Diskettes — (5-1/4" 40 track, box of 10) $24.95
- 16K Memory Kits (9 chips) — $25.00
- 5-1/4" Flip-Sort — $21.95
- 5-1/4" Plastic Library Case — $1.95

Apparat will continue to develop add-on products for your IBM Personal Computer. Call today for more information. Dealer inquiries welcome.

(303) 741-1778

IBM Personal Computer is a trademark of IBM.

Apparat, Inc.

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

"ON GOING SUPPORT FOR MICROCOMPUTERS"

CIRCLE 107 ON READER SERVICE CARD

Table 1. Comparison of Commands.

Pilot	Basic	Pascal
R: THIS IS A REMARK	REM THIS IS A REMARK	(*THIS IS A REMARK*)
T: GOOD, N , YOU SCORED #T	PRINT "GOOD, ";N$;" , YOU SCORED ";T	WRITELN ('GOOD, ',NAME,' , YOU SCORED ',T)
A: B$	INPUT B$	READLN (B)
M: RED!BLUE&GREEN	CA$="RED!BLUE&GREEN": GOSUB 10	MATCH ('RED!BLUE&GREEN')
J: LABEL	GOTO 500	GOTO LABEL
JY: LABEL	IF Y THEN 500	IF Y THEN ---
TN: SORRY, THE ANSWER IS A	IF N THEN PRINT "SORRY, THE ANSWER IS ";A$	IF N THEN WRITELN ('SORRY, THE ANSWER IS ',A)
U(T>13): SUBLABEL	IF T>13 THEN GOSUB 800	IF T>13 THEN PROCEDURENAME
E:	RETURN	END
C: X=4*B+3	X = 4*B+3	X:=4*B+3
D: W(20,15)	DIM W(20,15)	TYPE W=ARRAY [1..20,1..15] OF REAL

location in the program. The Use command provides for the execution of subroutines.

When writing a Pilot program the command names described above are abbreviated to one letter (See the first column of Table 1 for examples). These commands may be followed by a character or an expression which serves as a modifier or conditioner of the command. A modifier character changes the nature of the command. For example, an "S" following the Match command allows for one-letter misspelling when comparing the student's answer to the author's answer. A conditioner character or expression causes the command to be skipped unless the specified condition is met. For example, a Type command followed by a "Y" will only be executed if the previous match was successful (the student's answer matched the author's answer).

The command and optional modifier and/or conditioner must be followed by a

Kelly's Computing

ATARI SPECIALS

NEW FOR ATARI

☐	16k	Action Quest (Disk & Cass)	29.95 Now	25.50
☐	48k	Bishop Square (Disk)	29.95 Now	25.50
☐	32k	Apple Panic (Disk)	29.95 Now	25.50
☐	32k	Raster Blaster (Disk)	29.95 Now	25.50
☐	32k	Bug Attack (Disk & Cass)	29.95 Now	25.50
☐	32k	Crossfire (Disk & Cass)	29.95 Now	25.50

GAMES AND ACCESSORIES

☐	24k	Adventures 1-12 from Adventure Int'l	ea. 19.95 Now	16.50
☐	24k	Adventure's 1-12 Limited Gold Edition	100.00 Now	87.50
☐	16k	Ghost Hunter (Disk)	34.95 Now	29.50
☐	16k	Ghost Hunter (Cass)	29.95 Now	25.50
☐	48k	Word Processor (2 Disk 1 Cass)	149.95 Now	129.50
☐	8k	Basketball (Needs Joy Sticks)(Cart)	34.95 Now	29.50
☐	8k	Asteroids (Needs Joy Sticks)(Cart)	44.95 Now	38.59
☐	8k	Star Raiders (Needs Joy Sticks)(Cart)	49.95 Now	42.50
☐	8k	Caverns of Mars (Cart)	39.95 Now	33.50
☐	8k	Space Invaders (Needs Joy Stick)(Cart)	44.95 Now	38.50
☐		Paddle Controller (Pair)	21.95 Now	19.50
☐		Joy Stick Controller (Pair)	21.95 Now	19.50
☐	16k	States & Capitals (Cass)	14.95 Now	12.50
☐	8k	Missle Command (Cart)	44.95 Now	38.50
☐	32k	Star Warrior (Disk & Cass)	39.95 Now	33.50
☐	32k	Rescue at Rigel (Disk & Cass)	29.95 Now	25.50
☐	32k	Crush, Crumble & Chomp (Disk & Cass)	29.95 Now	25.50
☐	32k	Invasion Orion (Disk & Cass)	24.95 Now	19.50
☐	32k	Mouskattack (Disk)	34.95 Now	29.50
☐	8k	K-Razy Shootout (Cart)	49.95 Now	42.50
☐	40k	Wizard Princess (Disk)	32.95 Now	29.50
☐	16k	Jawbreaker (Disk)	29.95 Now	25.50
☐	16k	Starbase Hyperion (Disk & Cass)	22.95 Now	18.50
☐	24k	Ali Baba and the Forty Thieves (Disk)	32.95 Now	27.50
☐	48k	The Shattered Alliance (Disk)	39.95 Now	33.50
☐	32k	Galactic Empire (Cass)	19.95 Now	16.50
☐	32k	Galactic Trader (Cass)	19.95 Now	16.50
☐	16k	Galactic Chase (Disk)	29.95 Now	25.50
☐	16k	Galactic Chase (Cass)	24.95 Now	19.50
☐	40k	Warlock's Revenge (Disk)	35.00 Now	29.50
☐	32k	Ricochet (Disk)	19.95 Now	16.50
☐	8k	Kayos (Disk & Cass)	34.95 Now	29.50
☐	40k	Hi-Res Adv. #0 Mission Asteroid (Disk)	24.95 Now	19.50
☐		Frogger (Disk)(Avail. Summer)	34.95 Now	29.50
☐		Arcade Pro Football (Disk)(Avail. Summer)	34.95 Now	29.50
☐		Arcade Pro Football (Cass)(Avail. Summer)	29.95 Now	25.50
☐	40	Empire of the Overlord (Disk)	35.95 Now	29.50
☐	40	Empire of the Overlord (Cass)	30.95 Now	25.50
☐	24	Tankticks (Disk)	29.00 Now	25.50
☐	24	Tankticks (Cass)	25.00 Now	19.50

EDUCATIONAL

☐	48k	Compu-Math Fractions (Disk)	39.95 Now	33.50
☐	32k	Compu-Math Fractions (Cass)	29.95 Now	25.50
☐	48k	Compu-Math Decimals (Disk)	39.95 Now	33.50
☐	32k	Compu-Math Decimals (Cass)	29.95 Now	25.50
☐	16k	French (5 Cass)	59.95 Now	50.50
☐	16k	German (5 Cass)	59.95 Now	50.50
☐	16k	Spanish (5 Cass)	59.95 Now	50.50

SEND FOR FREE PRICE LIST

Include $2.00 for Shipping and Handling. California Residents add 6% Sales Tax. All orders shipped from stock within 48 hours. We accept **Mastercard and VISA.** C.O.D.'s add $5.00. Prices subject to change without notice.

NAME _____

STREET _____

CITY _____ STATE _____ ZIP _____

CARD # _____ EXP. DATE _____

SIGNATURE _____

3515 Bryce Way, Riverside, CA 92506 • (714) 787-7002

CIRCLE 169 ON READER SERVICE CARD

colon. The colon may be followed by appropriate parameters such as the author's answers to be matched, the expression to be evaluated, etc. Examples of these features may be found in the first column of Table 1.

A CAI language such as Pilot which tries to simplify the courseware author's task by reducing the number of commands in the language has a significant liability. The restriction in the domain of commands creates a restriction in the range of possible outcomes or applications.

Several versions of Pilot written in other high level languages such as Basic expanded the domain of the language by allowing instructions from the host language to be included in a Pilot program by embedding them as parameters into Pilot Compute commands. The severe liability inherent in the limited Pilot commands became very evident to the author while reviewing the code for a Pilot program where almost one-half of the program statements were Compute commands which used instructions from the host language.

The original version of Pilot developed at the San Francisco Medical Center had such a restriction of domain and range that many institutions began developing extensions to the language. Attempts have been made to standardize these extended features into a version called Common Pilot. However, many of the extended features of Common Pilot are merely adaptations of commands available in other high level languages. The Apple version of Pilot has been further extended to include graphics and sound editors.

The principle reason for selecting Pilot over other, more powerful, general purpose languages such as Basic or Pascal seems to be the ease with which it can be learned. However, this reasoning may be somewhat fallacious. Table 1 lists the principle commands available in Pilot along with corresponding commands in Basic and Pascal which perform similar functions. This comparison reveals that a subset of Basic or Pascal which matches the domain of Pilot commands could be learned just as easily. However, the more powerful languages offer the advantage of additional capabilities when the author is ready to go beyond the minimal subset. If an author begins by learning Pilot and then desires greater power, he must then scrap Pilot and begin learning a new language. Why not begin with a powerful language in the first place?

Although Table 1 shows that a subset of Pascal would be just as easy to learn as Basic or Pilot, a word of caution is in order. Most textbooks and manuals on Pascal currently available do not begin with a simple subset of Pascal that can be easily learned. Rather than beginning by showing how commands can be used in a simple, straightforward fashion, most authors try to present commands in their total complexity. The Pascal language is also embedded in a powerful but complex operating system which includes a text editor and file handler. In order to program in Pascal successfully, an author must also learn how to use the Pascal operating system.

The very nature of the principal Pilot commands strongly encourages novice programmers to use a mediocre strategy.

In addition to simplifying the author's task by reducing the domain of commands, Pilot also includes commands designed specifically for instructional applications. This technique is clearly laudable and is obviously necessary in any effort to tailor a computer language for courseware development. However, when this approach is coupled with a restriction in the domain of commands, additional liabilities are incurred. The majority of the commands may be tailored to specific instructional needs while more general purpose commands are excluded. Often the specific commands selected are chosen based on an implied instructional strategy. The availability of this set of commands and the exclusion of more general commands inadvertently requires authors to use a particular strategy and further limits the range of possible applications.

Several CAI languages, including Pilot, include a set of commands which foster a tutorial or dialogue CAI instructional strategy. A tutorial strategy includes a repetitive sequence of the instructional elements or frames listed in Table 2. This particular strategy is advocated by some because of its similarity to a strategy that might be used by an instructor tutoring a student one-on-one. If the segment to which a program branches is made conditional on the student's response then the instruction can be customized to the needs of each student.

Although such a strategy sounds great, in practice it is generally just plain boring. Often the questions asked merely require the student to copy words or data presented in the previous information frame. In fact, one could argue that the resulting CAI program is little more than a fancy and expensive page turner. The same strategy could be successfully implemented using a branching program text.

Obviously Pilot does not force an author to use a poor tutorial strategy. It is possible to implement other types of strategies using Pilot. One can also develop more creative tutorial programs. However, the very nature of principal Pilot commands strongly encourages novice programmers to use a mediocre strategy.

One of the main advantages of Pilot is the provision of the high level command Match. The Match command allows a Pilot program to perform moderately sophisticated natural language processing. Students may enter free form answers which can be successfully analyzed by the Match command. Many general purpose languages such as Basic, APL and Pascal do not have a comparable command. The author must write special subroutines or procedures to perform similar functions. (See Table 1.)

All computer languages provide a set of basic or primitive commands which can be used to define and perform a higher order function. A set of computer commands organized to perform a specific function is often referred to as a program. Most languages also allow such a set of commands to be defined as a subroutine which can be called from different places in a main program.

These subroutines can subsequently be used as higher order commands to perform complex functions which cannot be performed by a single primitive command in the language. Such higher order commands can greatly simplify the author's task while simultaneously providing greater power.

Although Pilot and Basic provide for

Table 2.

Frames	Pilot Commands
1. Present information	T: Information
2. Ask questions	T: Question
3. Accept student response	A:
4. Check for correct answer	M: Correct Answers
5. Give appropriate feedback	TY: Very Good TN: Sorry, that's wrong
6. Branch to next segment	JY: Next

the specification and calling of subroutines, this capability is severely limited. Many versions of Basic refer to subroutines by number, which reduces the readability of the program.

Neither Basic nor Pilot provides for the passing of parameters from the main program to the subroutine. This makes it nearly impossible to develop subroutines which are truly modular. They cannot be used as a black box and plugged into any program without revision. Thus they are not very useful as higher order commands to an author who is not familiar with their internal workings. The variables in the subroutines are not local to the subroutines and thus may affect variables elsewhere in the main program. This can create bugs in the program which are difficult to find and correct.

On the other hand languages such as Pascal, APL, Logo and the new Actor languages such as Smalltalk provide for truly modular subroutines. Variables can be made local to a subroutine. Once such subroutines have been developed and verified to perform a function, they can be used as higher order commands without regard to their internal operations.

Pascal even allows for such subroutines to be placed in a system library and subsequently linked into any program with a single command. Such capabilities make it possible to extend a language and tailor it to meet specific needs. As mentioned earlier, defining higher order commands in this way simplifies the author's task while at the same time providing greater capacity.

Authoring Systems

Authoring Systems have been developed in an attempt to overcome the problem of having to learn a computer programming language. This is generally accomplished by separating the logical sequencing and the control of the computer program from the instructional content. The logical sequencing of instructional frames or the instructional strategy is preprogrammed into the authoring system. The author is therefore relieved from worrying about the logic and strategy of the courseware and may concentrate on the content of the instructional frames. The authoring system provides the author with a template in which to place the content to be presented.

For example, in the Bell and Howell's Genis Courseware Development System an author merely enters the text for presentation frames, question frames, correct answers, incorrect answers, feedback messages for each alternate answer, etc. The author is prompted by Genis to enter each item of information. The sequence and instructional logic is automatically built into the system.

Authoring in the Ticcit system is slightly more complicated, but the resulting courseware is more flexible. Ticcit was designed based on the philosophy of learner control. When students interact with a completed Ticcit lesson, they are given control over the content and sequence of the instructional segments they study.

The desired presentation form is selected when the student presses special learner control keys on the keyboard. These keys are labeled: Objective, Rule, Example, Practice, Help, Map, Advice, etc. Thus, if students press the key labeled Practice, they will receive a practice item. If they press Advice, they will receive guidance on what to do next. The map provides a table of contents in diagram form showing the hierarchical relationship between lessons. Students may select a different lesson segment when the map is displayed.

Authoring systems reduce cost and effort by reducing variety in much the same way that cost and effort are reduced in fast food restaurants.

Ticcit provides several packaging routines which allow an author to type in content for the rules, examples, practice items, etc. that will make up a lesson. As with Genis, the Ticcit system automatically takes care of the storage and retrieval of the various presentation form files. Thus the author does not have to worry about the computer logic required to display the appropriate instructional frame or presentation form when students press one of the learner control keys.

Authoring systems such as Genis and Ticcit simplify the author's task by using all three techniques listed earlier: very high level routines are built into the system to control the logical sequencing of the instruction; this logical sequencing is designed according to an instructional strategy which meets the specific needs of certain instructional applications; and the domain of possible strategies is obviously reduced.

Authoring systems reduce cost and effort by reducing variety in much the same way that cost and effort are reduced in fast food restaurants, tract homes and formula television shows.

With Ticcit and Bell and Howell's Courseware Development System the author is given a template to use. Although the template greatly simplifies the task, it forces the author to turn out courseware which conforms to the template. Such templates can have the effect of enhancing the quality of the courseware produced by the novice, while restricting the quality of the courseware produced by a creative author. The general quality of the courseware produced is dependent on the quality of the template.

Conclusions

•Authoring systems or languages allow authors to turn out respectable courseware using a specific template. However, authors must recognize the limits of the template, and not try to force all instruction to fit the template. The use of templates would be more acceptable if a variety of templates were provided for the different types of learning.

•CAI languages should not reduce the domain of commands. Beginning authors should initally be taught a simple subset of a language which will allow them to begin writing simple programs quickly. However, they should then have the option to learn additional commands which will give them additional capabilities and allow them to develop more sophisticated courseware.

•CAI languages should not be restricted to commands developed specifically for certain types of instructional applications.

•Experience in developing CAI courseware and in training students to develop courseware has shown that authors very quickly reach the limitations of whatever language they are using. They then clamor for additional capabilities.

•CAI languages should provide for the straightforward development and use of higher order commands which increase the power of the language but do not exclude elementary operations.

•The best language might be a general purpose language, which provides great flexibility, with the provision of higher order commands for instructional applications.

•When possible, subject matter experts with little computer experience should team up with programmers who have had considerable experience programming in a sophisticated language.

As microcomputers invade the home and classrooms the need for large quantities of quality courseware will become acute. It is imperative that authors select an appropriate tool to maximize their productivity and the quality of their courseware products. Care must be exercised to avoid selecting tools which will sacrifice quality for quantity. □

LOGO Ideas

Robert Lawler

Hooray for Bugs!

Making a square with the turtle is pretty easy, FORWARD 100, RIGHT 90 and do it again and again and again. The simplest procedure does it this way, using "recursion" (the third line, "SQUARE" means perform the entire procedure again):

```
TO SQUARE
FORWARD 100
RIGHT 90
SQUARE
```

A procedure to make a *little* square would start with the turtle going forward some smaller distance, such as ten turtle steps. One little change can make a square maze grow out of the little square. You can figure out just what the turtle will draw with this procedure:

```
TO SQUARE.MAZE :DISTANCE
FORWARD :DISTANCE
RIGHT 90
SQUARE.MAZE  :DISTANCE + 5
```

When the turtle turns RIGHT 90, the maze is square. How much should the turtle turn to make a six-sided maze? ("Sixty degrees," you say? That's right.) How much to make a five-sided maze? Five is halfway between four and six. Because 75 is halfway between 60 and 90, that would be one good guess for how many degrees to turn.

```
TO FIVE.MAZE :DISTANCE
FORWARD :DISTANCE
RIGHT 75
FIVE.MAZE:DISTANCE + 5
```

Would you say that using 75 is a mistake because it does not make exactly what you hoped? If so, you must be willing to see that mistakes can be good things. When the result of a procedure turns out to be different from what was expected, programmers say the procedure has a "bug." But sometimes the surprising result is a better one than what you first intended. That's a "new discovery" bug, one of the best kind.

Any bug, something which makes your procedure do the unexpected—if you bother to figure it out—leads to an increase in your knowledge. Although a bug may hinder your objective, the bugs in your procedures will offer the best guidance on what to learn in order to master the Logo programming environment. If bugs can lead you into new discoveries and give good guidance on what to learn, this suggests a new way a teacher or advisor could be helpful to you. Such an advisor could help in exploring and understanding the difference between what you expected and what the computer did. If you, or anybody else, want to know how you are progressing with the computer, the best indication of progress in understanding is a record of the bugs you have encountered, and understood, and those on which you are still working.

Robert Lawler, Ph.D., Associate Director, Logo, P.O. Box 1551, Ansonia Station, New York, NY 10023.

Thinking About Variables

Variables are names which have values assigned to them. A good first way to think about variables is as little boxes, say the kind that are used to keep wooden matches in. Computer memory is made of these little boxes, each of which may or may not have something in it. Naming the boxes is a good way to keep track of specific boxes into which you put things. When you ask what is in a specific box, for example, :BOX2 (read as "dots Box 2"), you don't change what's in the box. When you use the MAKE command, you always CHANGE the contents of the box. You could think of it as emptying the box before packing a new thing in it.

A second important way to think about variables comes from their use as inputs to procedures. You can imagine a procedure as a list of instructions to be performed by a lazy little man. The little man knows how to do what the steps of his procedure specify. He sleeps whenever he is not doing his procedure. He wakes up when somebody calls his name; then he does what he knows how to do and goes back to sleep. The little man never sees other people, but he can get mail in his mail box. This is necessary because he sometimes needs a message to specify exactly how he should execute a command. The message in his mail box when he wakes up is the value of the input variables he needs to perform the steps of his procedure.

A third important way to think about variables comes from their use in controlling the repetition of procedures (whether by looping or by recursion). Here are two ways to draw a square with iteration:

```
TO SQUARE1
1: MAKE "COUNT 4
2: IF:COUNT = 0 STOP
3: FORWARD 25 RIGHT 90
4: MAKE "COUNT (:COUNT - 1)
5: GO "2
END
SQUARE1

TO SQUARE 2 :SIDES.LEFT
IF :SIDES.LEFT = 0 STOP
FORWARD 25 RIGHT 90
SQUARE2 (:SIDES.LEFT - 1)
END
SQUARE2 4
```

Executing SQUARE1 or SQUARE2 4, the turtle passes over each side one time. If the variable is given some other value, the turtle traces that many sides of a square. In general, such iteration count variables control execution of the steps within the boundaries of a procedure.

Summary

Variables—permit indirect reference to values which may change—as one may refer to the contents of a box by naming the box.

Input variables—permit specification of values for use by operation within procedures referring to variables—one may think of them as messages needed by the little man who executes the procedure steps.

Iteration variables—control the number of times procedure steps are executed within their iteration boundary. □

Apple Logo has arrived

The sophisticated yet simple to use language you have been reading about is now available for your Apple II.® Contact your Apple dealer today.

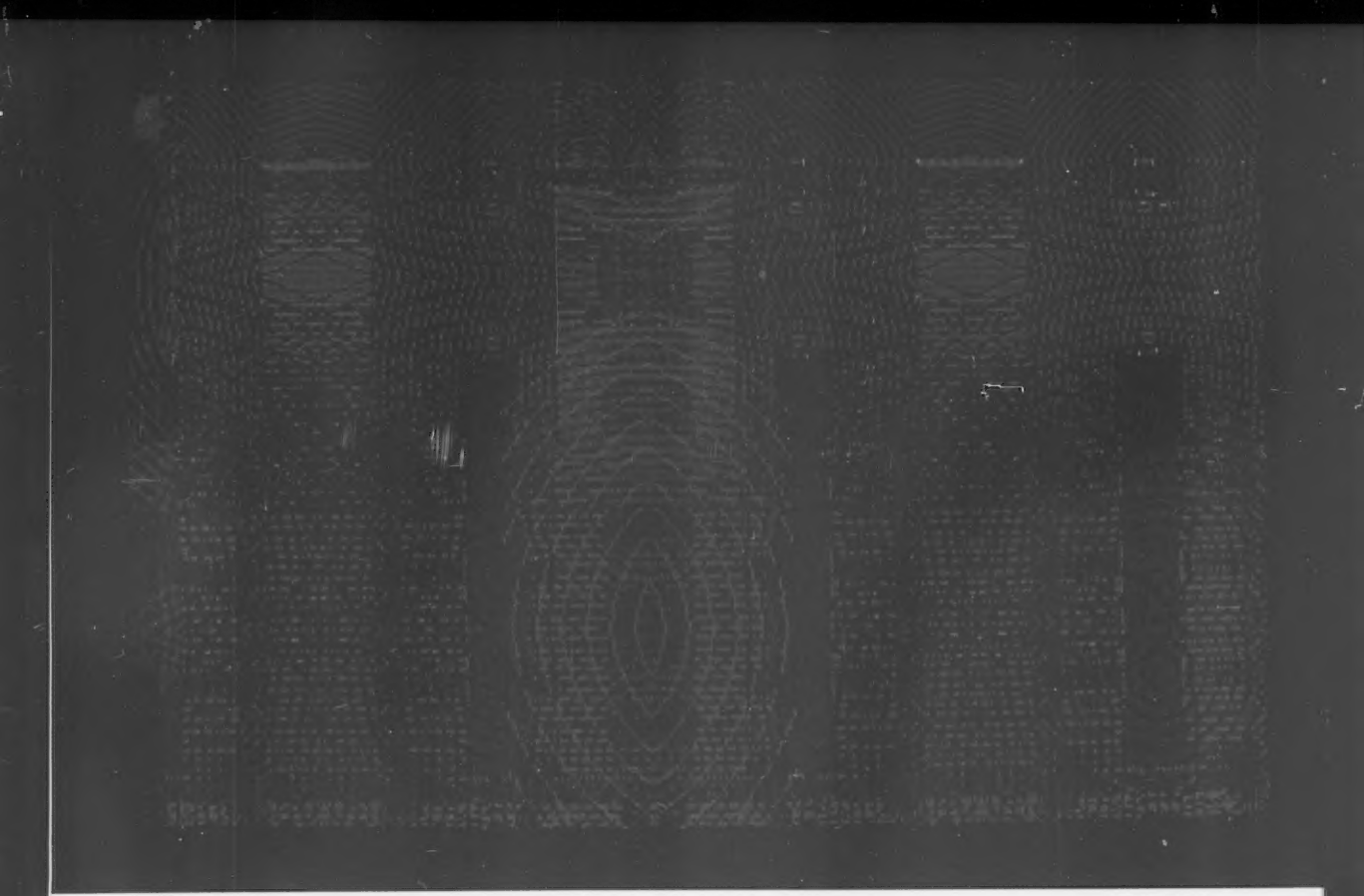
logo computer systems inc.

222 Brunswick Blvd.
Pointe Claire, Que.
Canada
(514) 694-2885

989 Avenue of the Americas
New York, N.Y.
U.S.A.
(212) 564-6020

CIRCLE 175 ON READER SERVICE CARD

®Registered Trademark, Apple Computer Inc.



Cover Story

Walter Wright

A Versatile Graphics System

We recently received a group of slides of dramatic computer graphics with outstanding picture detail. We decided to use one on our new advertising rate card and another as the cover of this issue. A third one is with this write-up.

I asked Walter Wright to put together an article about the techniques used to produce these images which he promised to do. However, in the meanwhile he provided details about his system and how these images were produced.

I tentatively called the image on the cover, "The Man Wearing Glasses" and the one with this writeup, "Three People Standing Next to Each Other." Thus the titles on two sections in Walter's description.

Walter notes that the first person plural to which he refers is David Cook and himself, both artists and programmers, and sometimes James Guida and Jay Watterworth who are partners in Digital Image Corp. —*DHA*

Hardware

Digital Image Corp. of Grand Rapids, MI, has a Cromemco Z2 with SDI graphics and two 48KTP image planes, a Mitsubishi color monitor, a Houston Instruments bit pad, a Via Video frame grabber with B&W video camera and a Matrix Instruments camera system. All the equipment is off-the-shelf except the Matrix which is off-the-wall. It has been modified at great personal risk to accept a pin registered Nikon back. Images are created in software, for example, word copy, charts and graphs, geometric patterns, etc.; or by transforming a digitized frame of video.

Software

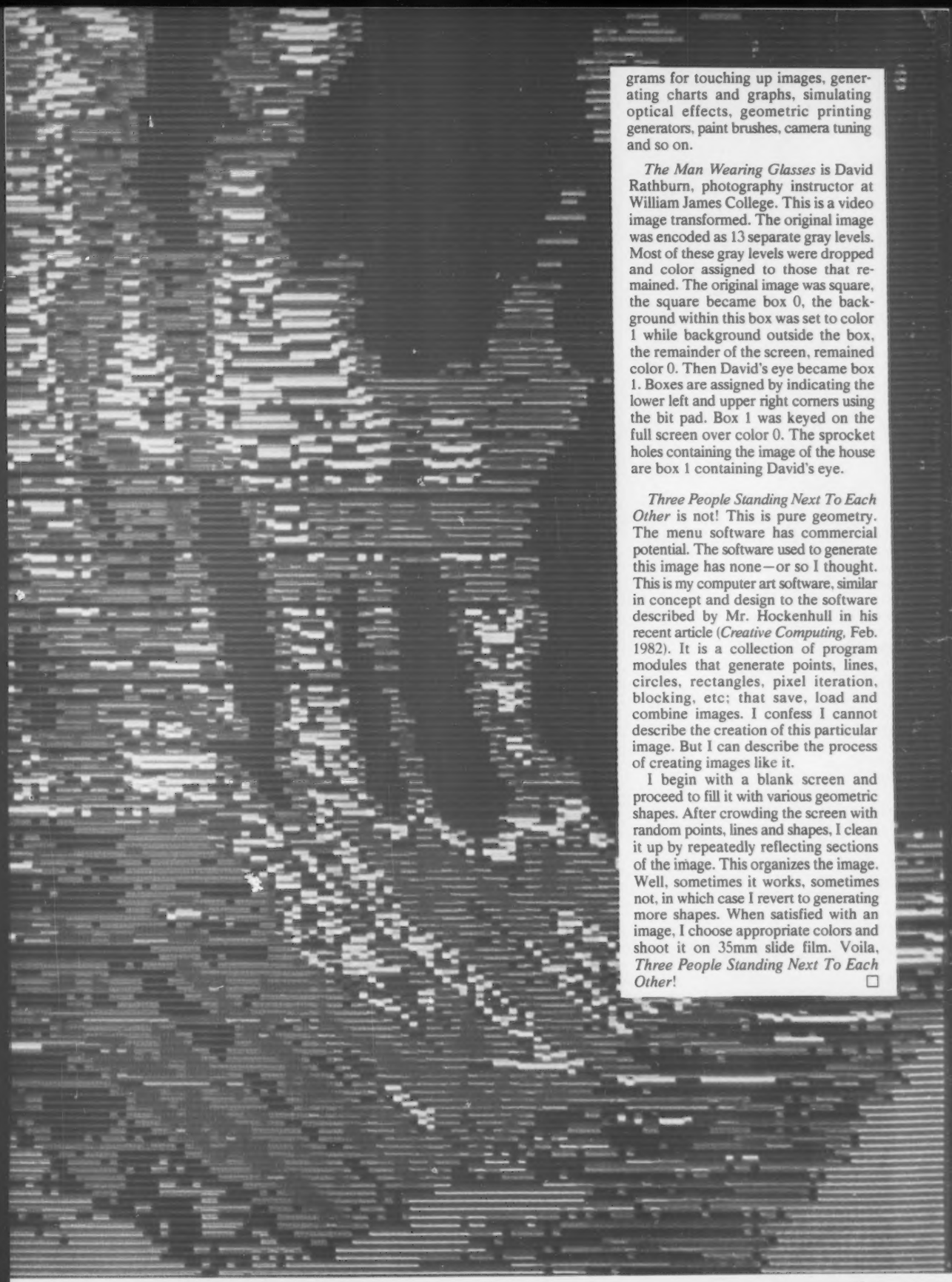
We have written 90% of our software, in both Fortran and Assembler. Most of Cromemco's SDI utilities have been replaced. We started by programming type faces and graphic symbols, shape tables, word copy and "cut and paste." Typefaces were a big headache, our present digital fonts do not use curves.

Next came the menu system. We use the leftover area of the 48KTP image plane to store user-defined color maps and "boxes." Our picture packing and unpacking routines preserve this information on disk. With the box construct we cut and paste letters, lines of text and symbols. We can shift, move and copy boxes. We can left or right justify any group of boxes on any other box. We can center any or all boxes. We can save, load, add, subtract, and, or, xor any box, group of boxes, camera image or disk file with any or all boxes. The menu allows color for color substitution. Finally, we are developing a macro capacity so that user-defined special effects can be assigned to unused buttons on the menu.

Last and least there is a "shoot" program which handles all image files, takes care of multiple exposures, duplicate slides and prompts the operator while he is actually shooting slides on the Matrix camera.

I've left out several programs—pro-

Walter Wright, William James College, Allendale, MI 49401



grams for touching up images, generating charts and graphs, simulating optical effects, geometric printing generators, paint brushes, camera tuning and so on.

The Man Wearing Glasses is David Rathburn, photography instructor at William James College. This is a video image transformed. The original image was encoded as 13 separate gray levels. Most of these gray levels were dropped and color assigned to those that remained. The original image was square, the square became box 0, the background within this box was set to color 1 while background outside the box, the remainder of the screen, remained color 0. Then David's eye became box 1. Boxes are assigned by indicating the lower left and upper right corners using the bit pad. Box 1 was keyed on the full screen over color 0. The sprocket holes containing the image of the house are box 1 containing David's eye.

Three People Standing Next To Each Other is not! This is pure geometry. The menu software has commercial potential. The software used to generate this image has none—or so I thought. This is my computer art software, similar in concept and design to the software described by Mr. Hockenhull in his recent article (*Creative Computing*, Feb. 1982). It is a collection of program modules that generate points, lines, circles, rectangles, pixel iteration, blocking, etc; that save, load and combine images. I confess I cannot describe the creation of this particular image. But I can describe the process of creating images like it.

I begin with a blank screen and proceed to fill it with various geometric shapes. After crowding the screen with random points, lines and shapes, I clean it up by repeatedly reflecting sections of the image. This organizes the image. Well, sometimes it works, sometimes not, in which case I revert to generating more shapes. When satisfied with an image, I choose appropriate colors and shoot it on 35mm slide film. Voila, *Three People Standing Next To Each Other*! □

ATARI OWNERS, WE'VE OPENED UP A WHOLE NEW WORLD FOR YOU.

At SSI, we established our reputation in quality computer games by producing some of the finest strategy simulations for the Apple® and TRS-80.®

Well, Atari owners, this is your lucky day. Because we've just introduced our first game for the Atari® 800 computer: THE SHATTERED ALLIANCE.™

With it, we've opened up for you SSI's world of fun and excitement in a big way — by literally creating an entire planet called *Osgorth* to serve as your personal playground!

OSGORTH! It is a wonder world of fantasy and adventure populated with creatures as varied as they are enchanted: dwarves, unicorns, Valkyries, centaurs, lizardmen and zorgs (whatever they are!)... just to name a few. They are preassembled into different armies, categorized into five classes of infantry and three of cavalry. They are meticulously rated for armor, speed, strength, and morale. Their weapons may be the bow, javelin, spears, pikes, cavalry lance, swords, axes, clubs, and rocks. They can even call on magic spells to enhance their speed, attacking or defensive power, or courage.

THE SHATTERED ALLIANCE is much more than a sophisticated strategy game. It is a rich tale of magic, rivalry among realms, and war among exotic beings. Best of all, these fantasy soldiers are *yours* to command as you roam Osgorth in search of glory and conquest.

As an added bonus for the Ancient-battles enthusiasts, we have included™ scenarios such as *Carthage vs. Alexander the Great.*

THE COMPUTER PROGRAM is a veritable wizard. With color Hi-Res graphics, it paints a beautiful Osgorthian landscape that is your battleground. It keeps track of all details so you can concentrate solely on strategy planning while its *Rapidfire* movement system makes for smooth and fast action. It even provides a powerful and intelligent computer opponent for solitaire play.

All you need to play this game is a 48K Atari 800 with mini floppy disc drive. For only $39.95, you can own this fantastic piece of real estate. So hurry on down to your local game/computer store and get THE SHATTERED ALLIANCE today!

To order with your VISA or MC, call **toll free 800-227-1617, ext. 335** (800-772-3545, ext. 335 in California). To order by mail, send your check to Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. All our games carry a 14-day money back guarantee.

Also available for 48K Apple II with ROM for $59.95.

SSI

STRATEGIC SIMULATIONS INC

Atari is a registered trademark of Atari, Inc.

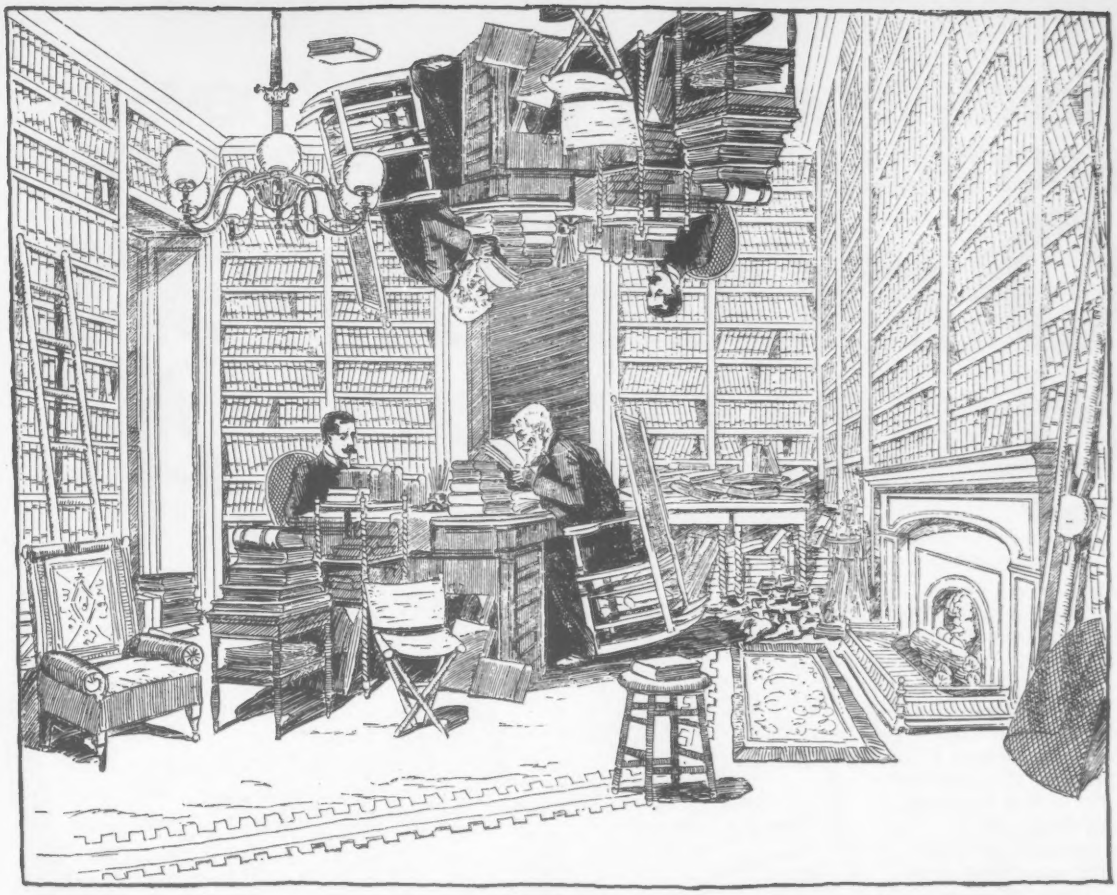
As part of our demanding standards of excellence, we use BRAND floppy discs.

WE'RE LOOKING FOR A FEW GOOD DESIGNERS. We're always on the lookout for high-quality games from independent designers. If you have game programs that you'd like SSI to publish, give us a call at (415) 964-1353 or write to SSI, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043.

Apple is a registered trademark of Apple Computer Inc.

CIRCLE 245 ON READER SERVICE CARD

TRS-80 is a registered trademark of the Tandy Corporation



LOOPHOLES

Peter Payack

In a stunning and unparallelled move,
lawyers are beginning to explore an apparent "loophole"
in the long standing and fundamental *Law of Gravity*
in the hope of "overturning" it!

The lawsuit,
which was filed as a "class action suit,"
contends that the *Law of Gravity*
by its all-encompassing one-dimensional nature
is essentially limiting in scope
particularly in view of our contemporary
"anything goes" culture.
Antitrust statutes which severely limit monopolies
will be sighted as precedents.

If by means of the courts
lawyers can successfully overturn
this centuries old dictum
it may open vast new possibilities for the re-structuring
of our society, world, and universe.

Peter Payack, 64 Highland Ave., Cambridge, MA 02139.

One practical example
would be to utilize ceilings and walls
as living spaces
and thus alleviate much of the global housing shortage
by more than doubling the "floor plan" of the average dwelling!
Not only are lawyers cautiously optimistic about this case
but they are already speculating
about their next action:
to find a loophole in the *second law of thermodynamics*,
or "entropy."

According to scientific theory,
this classic tenet holds that everything in the material world
including ball point pens, t.v.'s, comets,
western civilization, toasters, the eco-system
of the planet, foreign cars, and the very
universe itself,
is falling apart in an irreversible and unstoppable fashion.

"It's about time someone takes this sensitive and delicate
matter out of the hands of the bumbling scientists,"
declared one prominent lawyer and consumer advocate.
"Now we'll see," he continued smugly while lifting
his eyes upward,
"if *we* can turn this whole damn mess around!" □

Here's proof that you don't have to sacrifice on service to save money:

Our customers gave us an A-

We're proud of our service but continually search for ways to improve it.

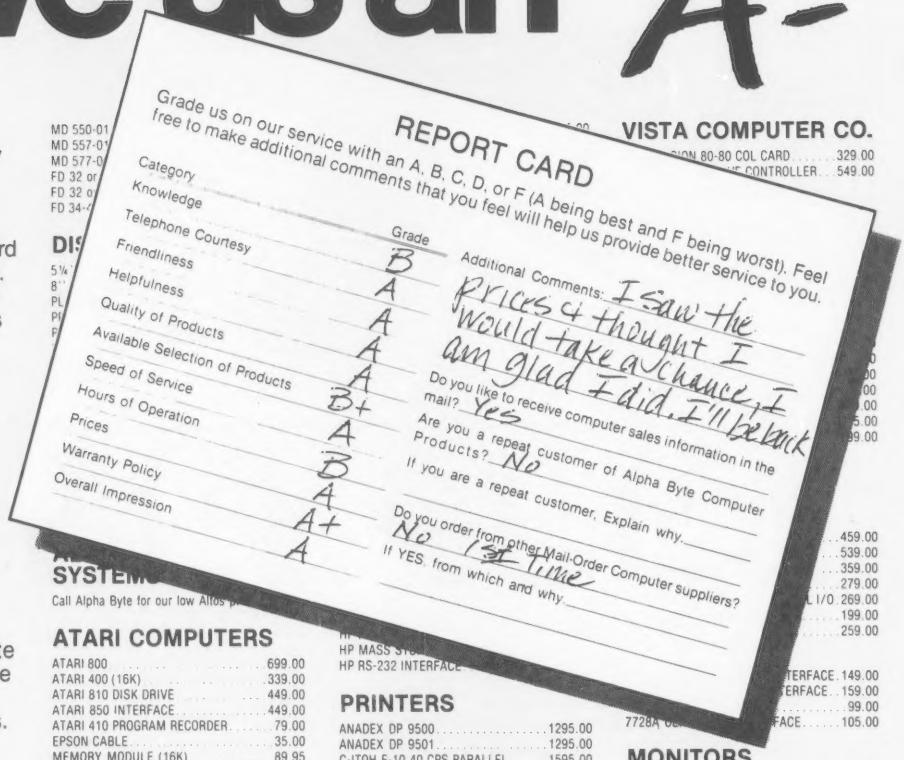
That's why we include this Report Card in every order we ship. (We even offer a $5.00 discount to customers who fill out the card and return it.)

We want to know what you think: what you like, what you don't. How can we serve you better?

So far, we have received over 5,000 Report Cards. You've told us you think our salespeople are knowledgeable and friendly. You appreciate that we carry a full line of products at the lowest possible prices. And, you enjoy the economy and convenience of mail-ordering.

Overall, we got an A-minus. Thank you.

We'll continue to ask for your opinion — our goal is an A-plus.



REPORT CARD

Grade us on our service with an A, B, C, D, or F (A being best and F being worst). Feel free to make additional comments that you feel will help us provide better service to you.

Category	Grade
Knowledge	B
Telephone Courtesy	A
Friendliness	A
Helpfulness	A
Quality of Products	A
Available Selection of Products	B+
Speed of Service	A
Hours of Operation	B
Prices	A
Warranty Policy	A+
Overall Impression	A

Additional Comments: I saw the Prices & thought I would take a chance, I am glad I did. I'll be back

Do you like to receive computer sales information in the mail? Yes

Are you a repeat customer of Alpha Byte Computer Products? No

If you are a repeat customer, Explain why.

Do you order from other Mail-Order Computer suppliers? No 1st time

If YES, from which and why.

16K RAM KITS 13.95

Set of 8 NEC 4116 200 ns. Guaranteed one full year.

DISKETTES

ALPHA DISKS 21.95

Single sided, certified Double Density 40 Tracks, with Hub-ring. Box of 10. Guaranteed one full year.

VERBATIM DATALIFE

MD 525-01, 10, 16 . . . . . 26.50

MD 550-01
MD 557-01
MD 577-0
FD 32 or
FD 32 o
FD 34-

DI

SYSTEM

Call Alpha Byte for our low Altos p

ATARI COMPUTERS

ATARI 800	699.00
ATARI 400 (16K)	339.00
ATARI 810 DISK DRIVE	449.00
ATARI 850 INTERFACE	449.00
ATARI 410 PROGRAM RECORDER	79.00
EPSON CABLE	35.00
MEMORY MODULE (16K)	89.95
JOYSTICK CONTROLLERS	10.00
PADDLE CONTROLLERS	19.95
STAR RAIDERS	35.00
MISSILE COMMAND	35.00
ASTEROIDS	35.00

INTEC PERIPHERALS RAM MODULES

48K FOR ATARI 400	279.00
32K FOR ATARI 800	135.00

ACTIVISION ATARI CARTRIDGES

LAZAR BLAST	21.95
SKIING	21.95
DRAGSTER	21.95
BOXING	21.95
CHECKERS	21.95
BRIDGE	21.95
KABOOM	21.95

HEWLETT PACKARD

HP COMPUTERS

HP-85A PERSONAL COMPUTER	2195.00

HP MASS S
HP RS-232 INTERFACE

PRINTERS

ANADEX DP 9500	1295.00
ANADEX DP 9501	1295.00
C-ITOH F-10 40 CPS PARALLEL	1595.00
C-ITOH 45 CPS PARALLEL	1770.00
C-ITOH 40 CPS SERIAL	1870.00
C-ITOH PROWRITER PARALLEL	549.00
C-ITOH PROWRITER SERIAL	695.00
C-ITOH COMET I	289.00
EPSON MX-80	$CALL
EPSON MX-80 F/T	$CALL
EPSON MX-100 GRAPHIC	$CALL
EPSON GRAFTRAX	90.00
IDS-445G PAPER TIGER	779.00
IDS-460G PAPER TIGER	945.00
IDS-560G PAPER TIGER	1195.00
IDS PRISM 80 W/O COLOR	1099.00
IDS PRISM 132 W/COLOR	1799.00
NEC SPINWRITER 3510 S. RO	1995.00
NEC SPINWRITER 3530 P. RO	1995.00
NEC SPINWRITER 7710 S. RO	2545.00
NEC SPINWRITER 7730 P. RO	2545.00
NEC SPINWRITER 7700 D SELLUM	2795.00
NEC SPINWRITER 3500 SELLUM	2295.00
OKIDATA MICROLINE 80	389.00
OKIDATA MICROLINE 82A	549.00
OKIDATA MICROLINE 83A	799.00
OKIDATA MICROLINE 84	1199.00
QUME 9/45	2149.00

VISTA COMPUTER CO.

ION 80-80 COL CARD 329.00
E CONTROLLER . . . 549.00

. . . . . 459.00
. . . . . 539.00
. . . . . 359.00
. . . . . 279.00
L I/O 269.00
. . . . . 199.00
. . . . . 259.00

TERFACE 149.00
TERFACE 159.00
. . . . . 99.00
7728A U FACE 105.00

MONITORS

NEC 12" GREEN MONITOR	179.00
NEC 13" COLOR MONITOR	399.00
SANYO 12" MONITOR (B & W)	249.00
SANYO 12" MONITOR (GREEN)	269.00
SANYO 13" COLOR MONITOR	469.00
ZENITH 13" HI RES GREEN MON	139.00
AMDEK COLOR I	389.00
AMDEK RGB COLOR	859.00
AMDEK RGB INTERFACE	169.00

MOUNTAIN HARDWARE

CPS MULTIFUNCTION BOARD	199.00
SUPERTALKER SD200	259.00
ROMPLUS W/ KEYBOARD FILTER	179.00
ROMPLUS W/O KEYBOARD FILTER	130.00
KEYBOARD FILTER ROM	49.00
COPYROM	49.00
MUSIC SYSTEM	369.00
ROMWRITER	149.00
APPLE CLOCK	252.00
A/D + D/A	299.00
EXPANSION CHASSIS	625.00

NEC PERSONAL COMPUTERS

PC-8001A CPU	899.00
PC-8012A I/O	559.00
PC-8033A DISK I/O	125.00
PC-8031A DUAL DISK	899.00

APPLE HARDWARE

VERSA WRITER DIGITIZER	259.00
ABT APPLE KEYPAD	119.00
MICROSOFT Z-80 SOFTCARD	299.00
MICROSOFT RAMCARD	159.00
VIDEX 80 x 24 VIDEO CARD	299.00
VIDEX KEYBOARD ENHANCER II	129.00
VIDEX ENHANCER REV 0-6	99.00
VIDEX SOFT SWITCH	29.00
M & R SUPERTERM 80 x 24 VIDEO BD	315.00
SSM AIO BOARD (INTERFACE) A & T	165.00
SSM AIO BOARD (INTERFACE) KIT	135.00
APPLE FAN	44.95
T/G JOYSTICK	54.95
T/G PADDLE	34.95
VERSA E-Z PORT	21.95
MICRO SCI A2 W/O CONTROLLER	419.00
MICRO SCI A40 W/CONTROLLER	479.00
MICRO SCI A40 W/O CONTROLLER	409.00
MICRO SCI A70 W/CONTROLLER	629.00
MICRO SCI A70 W/O CONTROLLER	549.00
THE MILL-PASCAL SPEED UP	329.00
PROMETHEUS VERSACARD	229.00
SUPERCLOCK II	129.00
LAZAR LOWER CASE +	59.00
MICROBUFFER II 16K W/GRAPHICS	259.00
MICROBUFFER II 32K W/GRAPHICS	299.00
WIZARD 80 COL VIDEO	279.00

MODEMS

NOVATION CAT ACOUSTIC MODEM	145.00
NOVATION D-CAT DIRECT CONNECT	165.00
NOVATION AUTO-CAT AUTO ANS	219.00
NOVATION APPLE-CAT	349.00
UDS 103 LP DIRECT CONNECT	175.00
UDS 103 JLP AUTO ANS	209.00
HAYES MICROMODEM II (APPLE)	299.00
HAYES 100 MODEM (S-100)	325.00
HAYES SMART MODEM (RS-232)	249.00
HAYES CHRONOGRAPH	225.00
LEXICON LX-11 MODEM	109.00
RACAL VADIC 1200 BAUD/212A	795.00

TERMINALS

TELEVIDEO 910	639.00
TELEVIDEO 912C	745.00
TELEVIDEO 920C	830.00
TELEVIDEO 950C	995.00
ZENITH Z-19	799.00

TRS-80 MOD I HARDWARE

PERCOM DATA SEPARATOR	27.00
PERCOM DOUBLER II	159.00
TANDON 80 TRACK DISK DRIVE	429.00
TANDON 40 TRACK DISK DRIVE	289.00
LNW DOUBLER W/ DOSPLUS 3.4D	159.00
MOD III DRIVE KIT	649.00

MORROW DESIGNS

FLOPPY DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M®, A & T.

DISCUS 2D (Single Drive — 500K)	869.00
DISCUS 2D (Dual Drive — 1 MEG)	1499.00
DISCUS 2 + 2 (Single Drive — 1 MEG)	1099.00
DISCUS 2 + 2 (Dual Drive — 2 MEG)	1999.00

HARD DISK SYSTEMS

Controller, P.S., Microsoft Basic, CP/M®, A & T.

DISCUS M10 (10 Megabytes)	3099.00
DISCUS M26 (26 Megabytes)	3749.00

ISOLATORS

ISO-1 3-SOCKET	53.95
ISO-2 6-SOCKET	53.95

BARE DRIVES

TANDON 5¼ INCH

100-1 SINGLE HEAD 40 TRK	219.00
100-2 DUAL HEAD 40 TRK	299.00
100-3 SINGLE HEAD 80 TRK	299.00
100-4 DUAL HEAD 80 TRK	429.00

TANDON THINLINE 8 INCH

848-1 SINGLE SIDE	459.00
848-2 DUAL SIDE	549.00

MICRO PRO

APPLE CP/M®

WORDSTAR*†	249.00
SUPERSORT*†	145.00
MAILMERGE*†	90.00
DATASTAR*†	215.00
SPELLSTAR*†	169.00
CALCSTAR*†	169.00

CP/M®

WORDSTAR	310.00
SUPERSORT	195.00
MAILMERGE	110.00
DATASTAR	245.00
SPELLSTAR	195.00
CALCSTAR	239.00

MICROSOFT

APPLE

FORTRAN*	165.00
BASIC COMPILER*	315.00
COBOL*	595.00
Z-80 SOFTCARD	299.00
RAMCARD	159.00
TYPING TUTOR	17.95
OLYMPIC DECATHLON	24.95
TASC APPLESOFT COMPILER	159.00

CP/M®

BASIC 80	299.00
BASIC COMPILER	319.00
FORTRAN 80	369.00
COBOL 80	595.00
MACRO 80	189.00
mu MATH/mu SIMP	219.00
mu LISP/mu STAR	175.00

APPLE SOFTWARE

MAGIC WINDOW	79.00
MAGIC SPELL	59.00
BASIC MAILER	59.00
APPLE PIE	99.00
DB MASTER	179.00
PFS: (NEW) PERSONAL FILING SYSTEM	85.00
PFS: REPORT	79.00
Z-TERM*	89.95
Z-TERM PRO*	129.95
ASCII EXPRESS	63.95
HAYDEN APPLESOFT COMPILER	149.00
EASY WRITER-PRO	199.00
EASY MAILER-PRO	79.00
EXPEDITER II APPLESOFT COMPILER	73.95
A-STAT COMP. STATISTICS PKG.	129.00
SUPER TEXT II	129.00
FINANCIAL PARTNER	199.00
LISA 2.5	59.95
SUPERSCRIBE II	99.95

CONTINENTAL SOFTWARE

G/L	199.00
A/R	199.00
A/P	199.00
PAYROLL	199.00
PROPERTY MGMT.	399.00
THE HOME ACCOUNTANT	59.95

PERSONAL SOFTWARE

DESKTOP PLAN II	199.00
VISIPLOT	179.00
VISITREND/VISIPLOT	239.00
VISIDEX	199.00
VISITERM	79.00
VISICALC	199.00
VISIFILES	209.00

CP/M® SOFTWARE

THE WORD-SPELL CHECK	75.00
d BASE II	599.00
SUPER CALC	229.00
SPELLGUARD	239.00
P & T CP/M® MOD II TRS-80	175.00
COMMX TERMINAL PROG.	82.50
C BASIC 2	115.00
PASCAL Z	349.00
PASCAL MT+	439.00
PASCAL/M	205.00
SYSTEMS PLUS — G/L, A/R, A/P, P/R	1799.00
CONDOR I	579.00
CONDOR II	849.00

DIGITAL RESEARCH

MAC	89.00
SID	69.00
ZSID	97.00
PL/ 1-80	439.00

SUPERSOFT

DIAGNOSTIC I	69.00
DIAGNOSTIC II	89.00
'C' COMPILER	179.00
UTILITIES I	59.00
UTILITIES II	59.00
RATFOR	89.00
FORTRAN	239.00

TRS-80 GAMES

TEMPLE OF APSHAI	34.95
HELLFIRE WARRIOR	34.95
STAR WARRIOR	34.95
RESCUE AT RIGEL	24.95
CRUSH, CRUMBLE AND CHOMP	24.95
INVADERS FROM SPACE	17.95
PINBALL	17.95
STAR TREK 3.5	17.95
MISSILE ATTACK	18.95
STAR FIGHTER	24.95

TRS-80 SOFTWARE

NEWDOS/80 2.0 MOD I, II	139.00
LAZY WRITER MOD I, II	165.00
PROSOFT NEWSCRIPT MOD I, III	99.00
SPECIAL DELIVERY MOD I, III	119.00
X-TRA SPECIAL DELIVERY MOD I, III	199.00
TRACKCESS MOD I	24.95
OMNITERM SMART TERM. MOD I, III	89.95
MICROSOFT BASIC COMP. FOR MOD I	165.00
LDOS 5.1 MOD I, II	159.00

APPLE GAMES

PERSONAL SOFTWARE

CHECKER KING	21.95
GAMMON GAMBLER	21.95
MONTY PLAYS MONOPOLY	29.95
ZORK I	32.95
ZORK II	32.95
MONTY PLAYS SCRABBLE	34.95

BRODERBUND

GALAXY WARS	20.95
ALIEN RAIN (AKA GALAXIAN)	20.95
ALIEN TYPHOON	20.95
APPLE PANIC	24.95
MIDNIGHT MAGIC	29.95
SPACE QUARKS	24.95

AUTOMATED SIMULATIONS

INVASION ORION	20.95
STAR WARRIOR	32.95
TUES. MORNING QUARTERBACK	25.95
CRUSH, CRUMBLE AND CHOMP	24.95
THE DRAGON'S EYE	20.95

MUSE SOFTWARE

ROBOT WARS	32.95
THREE MILE ISLAND	32.95
A.B.M.	20.95
GLOBAL WAR	20.95
CASTLE WOLFENSTEIN	24.95

ON-LINE SYSTEMS

WIZARD AND PRINCES	29.95
MISSILE DEFENSE	25.95
SABOTAGE	20.95
SOFT PORN ADVENTURE	24.95
THRESHOLD	31.95
JAW BREAKER	24.95
CROSSFIRE	16.45
TIME ZONE	72.95
H/R FOOTBALL	32.95
H/R CRIBBAGE	20.95
PEGASUS II	25.95

SIRIUS SOFTWARE

SPACE EGGS	24.95
GORGON	32.95
SNEAKERS	24.95
EPOCK	29.95
BEER RUN	24.95
HADRON	29.95
PULSAR II	24.95
EPOCK	29.95

EDU-WARE

PERCEPTION PKG.	19.95
COMPU-READ	24.95
COMPU-MATH: ARITHMETIC	39.95
COMPU-MATH: FRACTIONS	34.95
COMPU-MATH: DECIMALS	34.95
COMPU-SPELL (REQ. DATA DISK)	24.95
COMPU SPELL DATA DISKS 1-4, ea.	17.95

MORE GREAT APPLE GAMES

COMPUTER QUARTERBACK	32.95
TORPEDO FIRE	49.95
THE SHATTERED ALLIANCE	49.95
POOL 1.5	29.95
ULTIMA	83.95
RASTER BLASTER	24.95
FLIGHT SIMULATOR	27.95
INTERNATIONAL GRAND PRIX	25.95
SARGON II	28.95
SHUFFLE BOARD	29.95
FIREBIRD	24.95
SNACK ATTACK	24.95
THIEF	24.95
ROACH HOTEL	29.95
JABBERTALKY	24.95
THE WARP FACTOR	32.95
COSMO MISSION	24.95

SUPPLIES

AVERY TABULABLES

1,000 3½ x 15/16	8.49
3,000 3½ x 15/16	14.95
5,000 3½ x 15/16	19.95

FAN FOLD PAPER

(Prices F.O.B. S.P.)

9½ x 11 18lb WHITE 3,000 ct	29.00
14 7/8 x 11 18lb WHITE 3,000 ct	39.00

Alpha Byte COMPUTER PRODUCTS

To order or for information call (213) 706-0333

Modem order line: (213) 883-8976

We guarantee everything for 30 days. If anything is wrong, return the item and we'll make it right. And, of course, we'll pay the shipping charges.

We accept Visa and Master Card on all orders; COD up to $300.00.

Add $2.00 for standard UPS shipping and handling on orders under 50 lbs. delivered in continental U.S. Call for shipping charges over 50 lbs. Foreign, FPO and APO orders, add 15% for shipping. Californians add 6% sales tax.

Prices quoted are for stock on hand and subject to change without notice.

31245 LA BAYA DRIVE, WESTLAKE VILLAGE, CALIFORNIA 91362

CP/M is a reg. trademark of Digital Research. *Requires Z-80 Softcard. †Reg. trademark of Micro Pro International Corp.

CIRCLE 104 ON READER SERVICE CARD

Computer Graphics: An Art Medium in Lights

Charlotte M. Miller

Many of us who have home computers feel that "Computer graphics are for other people." Many computer owners overlook the graphic capabilities of their computers, relegating computer art to those with advanced programming talents.

Frequently, computer art is treated as "interesting," "colorful," or "nice," but not something a hobbyist would explore.

Because I am an instructor of English in a university, I acquired my system (Apple II Plus, disk drive, and VersaWriter) to write educational software with graphics. But I am also an artist, and have worked with oils, watercolors, and acrylics.

When I started working with VersaWriter, the artist overtook the teacher. I saw the computer as a new medium which paints with lights instead of pigments. As a result, I have not yet learned to program. I have spent all my computer time learning to draw landscapes, portraits, posters, and have even collaborated on some games and programs for profit.

Computer drawing is as absorbing as any other art medium, and one need not be an artist to do it well. The following text and pictures are intended as a kind of mini-cookbook describing what I have learned. Although my drawings are done with the Apple and VersaWriter, similar results can be achieved with different equipment.

First, as with any new medium, experiment and learn about the equipment. VersaWriter uses the Apple keyboard to change color, erase and touch up, save and recall pictures. These commands should be second nature so that drawing is not interrupted to refer to the instruction manual.

The color chart is of special interest because it provides a wide variety of colors that also create texture through patterns. These colors are used to fill in figures and add shading to the picture.

I saw the computer as a new medium which paints with lights instead of pigments.

In short, play with the possibilities for a while. Draw. Change color. Erase. Touch up. Fill in. Use your manual to become comfortable with the VersaWriter (or whatever digitizer you have). One must learn the capabilities of any tool, and this is certainly no exception.

Second, select a subject. Considerations of the medium must be made here. Although pictures can be rendered directly by watching the screen, VersaWriter is also designed to trace an original drawing. There are, however, some size limits.

The scaling function may be used to match the original to the screen (see the VersaWriter manual), but it is best to pick an original that is about 6" by 6". If the original is too small, it will be difficult to shade and render accurately. I chose a picture of the Mona Lisa from a magazine to illustrate the ability of the computer to trace and create pleasing new art.

The accompanying step-by-step illustrations of the process which produced the Mona Lisa show how simple it is to use this new art tool, although it requires some patience and care. The first picture is analogous to a rough sketch for painting. I chose an original that could be traced directly onto the screen without doing a new drawing or adjusting the size.

A white screen is easier to use and more like paper. The outline of the figure is traced and the areas to be shaded are outlined on the first drawing. I saved this basic sketch on disk for future use. That way, no matter what might happen while experimenting with the drawing, I could go back to the original, a flexibility not provided in other media. Watercolors, for example, are not so forgiving.

In Figure 2, the background colors and some shading in the face were added. I chose colors that would approximate and be true to the feel of an old painting because a literal rendering was not possible, or even necessarily desirable. The computer is a different medium with its own special charms.

VersaWriter has a color test function which makes color tests possible during this phase. If there is a mistake, the Paintbrush command can easily erase what you don't like. The dark blues, greens, and yellows of the original are suggested

Charlotte M. Miller, 4510 Blackfriar Road, Woodland Hills, CA 91364.

Your IBM personal computer deserves an Amdek Color-II monitor

To take maximum advantage of all your new IBM Personal Computer can do, you need a compatible monitor with extensive capabilities of its own. And for that, there's simply no better choice than Color-II from Amdek.

Color-II's high-resolution colors can help you visualize and analyze the most complex data. Whether you need your IBM for word processing, graphics, business analogy or scientific applications, Color-II has the display technology you need to utilize your IBM to the fullest.

Color-II features include:

- RGB input for high-resolution graphics and more vibrant colors
- 80 x 24 character display
- 560(H) x 260(V) resolution
- Intensification modulation for 16 color capability to match IBM's high resolution colors.
- IBM plug compatible cable and connector.
- Molded-in carrying handle for easy portability.
- Front-mounted controls for quick adjustments.
- Complete with one-year warranty covering all parts and labor; two-year warranty on picture tube.

So for the most efficient, effective use of your IBM computer, ask your dealer about the remarkable Color-II – part of Amdek's complete line of color, green phosphor and black & white video monitors. Then match Color-II's performance and price against any other high-resolution monitor. For quality and value, you'll choose Amdek.

AMDEK

Amdek Corporation, 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005 (312) 364-1180 • TLX: 25-4786

CIRCLE 106 ON READER SERVICE CARD

in the background color masses. This step went on disk too.

Coloring the face was the next task. In Figure 3, you can see the color test patch in the lower right corner. Use the paintbrush to erase this patch when you are finished.

Although coloring a face usually requires more care and correction than almost anything else, you can always recall the original if you ruin the basic image. This happens sometimes, especially when shading the mouth and eyes. If a few dots are off, the whole facial expression can change.

If this happens and you cannot seem to get it right, do not despair. Recall the previous picture, experiment and recolor until you are satisfied. Paintbrush mode plays a big part in this stage because it erases in tight areas and softens too heavy a pattern (Figures 4 and 5).

Figure 1.

Figure 2.

Figure 3.

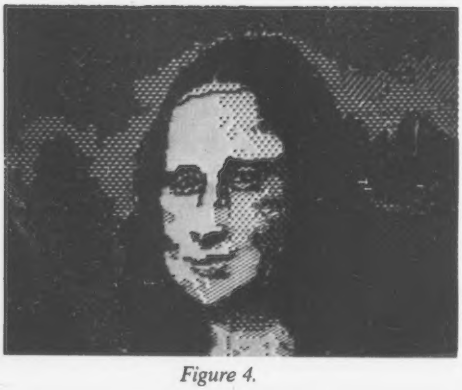


Figure 4.

Figure 5.

Western Micro Distributors
16 City Blvd. E. #108 Suite #315
Orange, Calif. 92668
(714) 937-0121

wabash
wabash
wabash

DISKETTES

	5¼"	8"
*SS/SD	23.00	24.00
SS/DD	25.00	28.00
DS/DD	31.00	34.00

Authorized Wabash Distributor

Dealers: Call For Qty. Pricing!
*Single Side Single Density

Micro-Sci Shuggart APPLE equivalent
Disk Drives
35 Track: with control unit — $485.00
35 Track: without cont. unit — $395.00

Zenith Monitor
·12inch
·15MHz
·Green Display
"ZVM-121"
$112.00

CIRCLE 257 ON READER SERVICE CARD

micromath

MICROMATH revolutionizes the teaching of math!

MicroMath is the only full, one-semester course of its kind in North America and is highly praised by instructors who use it.

Grade 8 to College Level
MicroMath is a complete review mathematics course which will be of value to students from Grade 8 to college level.

93 Lessons, 16 Tests, 150 Page Workbook
Students can choose from 93 separate lessons (each with pre-test and lesson) and work comfortably at their own speed, with peers or individually. Each unit has its own post-test and the entire package is supplemented with a 150 page workbook.

Runs on COMMODORE PET 16K and APPLE II +
Versions are available for all DOS formats.

$500 for Complete Package
A demonstration disk, consisting of 8 sample lessons and 2 tests, is available for only $25 (refundable upon purchase of complete package).

For more information:
Write - Mr. E.H. Bangay
SHERIDAN COLLEGE
Trafalgar Road
Oakville, Ontario
Canada L6H 2L1

or Call - (416) 845-9430

CIRCLE 231 ON READER SERVICE CARD

"Simply the best word processor...anywhere"

No hardware additions needed — What you see is what you get. All functions are displayed on the screen exactly as they appear in print including:

- Underlining
- Bold
- Superscript
- Even/normal justification
- Lower and upper case
- Block movement
- Global replace
- Plus many more features

"Word Handler is simply the best word processing software I could find anywhere by far."
William R. Moroney
President
Electronic Funds Transfer Association

Now Available!
List Handler
A mailing list program to work with the Word Handler (interfaces with VisiCalc™ and DB Master™) stores up to 3,000 records per disk, unlimited sorting field.

Word Handler

Once you buy a Word Handler we don't forget you; our customer service department is available daily. We support our products.

When upgrades are introduced you are supplied with a replacement disc FREE! Contact your local Apple™ dealer for a demonstration. You'll be glad you did.

Silicon Valley Systems, Inc. 1625 El Camino Real #4 Belmont, CA 94002

Silicon Valley Systems

CIRCLE 232 ON READER SERVICE CARD

SUPER TEXT™ ELEGANCE

Elegant...we think our new Super Text is just that. Never has word processing been so smooth...so polished in its functions, so flexible to your growing needs. Super Text features 40 or 80 column display, page headers and footers, Autolink™ and more, all programmed to make you efficient. Most functions are accomplished with a single keystroke, making it a direct flow to productivity. If you haven't thought of word processing as an elegant experience, you need to experience Super Text, from Muse. We stay one step ahead for your efficiency! Super Text from Muse for the Apple II, $175. Requires a Videx™ board for 80 column display.

MUSE™ Software
One Step Ahead
347 N. Charles Street
Baltimore, Maryland 21201
301-659-7212
Apple is a TM of Apple Computer Corp.

CIRCLE 193 ON READER SERVICE CARD

MX-80 OWNERS

MXPLUS™ ADDS NEW CONVENIENCE

- PERF-SKIP TO **AUTOMATICALLY** GIVE YOU TOP AND BOTTOM MARGIN ON EACH PAGE. (SWITCH SELECTABLE, OF COURSE)
- MANUAL PRINT MODE CONTROL TO LET YOU SELECT CONDENSED, EMPHASIZED, OR NORMAL PRINTING **INSTANTLY** USING THE PRINTER PANEL BUTTONS.

MXPLUS™ INSTALLS IN MINUTES, NO SOLDERING!

MXPLUS IS A PLUG-IN MODULE FOR STANDARD MX-80 AND MX-80 F/T. MODELS AVAILABLE SOON FOR MX-100 AND GRAFTRAX. PLEASE CALL. MXPLUS IS UNCONDITIONALLY GUARANTEED FOR 30 DAYS.
MX-80, MX-80 F/T, AND GRAFTRAX ARE TRADEMARKS OF EPSON.

ORDER TODAY
ORDERS CALL 24 HR 800-835-2246x441
INFORMATION CALL 213-969-2250

DRESSELHAUS COMPUTER PRODUCTS
22713 VENTURA BLVD SUITE F
WOODLAND HILLS, CA 91364

ONLY **$49.95**
POSTPAID CALIF ADD 6%
SAME DAY SHIPPING WITH MC/VISA

CIRCLE 153 ON READER SERVICE CARD

Art Medium, continued...

In Figure 4, I was dissatisfied with the cheek area, so I erased a small section with the smallest paintbrush and reshaded it. Sometimes you must color one pixel at a time. The Microscope command is sometimes useful here. It blows up a section so you can see it more easily. Be patient. The end result is worth it.

In these figures, the color test square was erased because by then I knew what colors I wanted where, and I knew the VersaWriter color chart by heart.

Photographing the Screen

When your final drawing is complete and saved to disk, what next? The answer, if you do not have a printer, or even if you do but want color reproduction, is photography. It is relatively simple to photograph good color slides from the television screen.

The equipment I used was an ordinary 35mm camera and a tripod. Use a slower film such as Kodachrome 64 instead of the faster ASA400, which seems to produce too much blue. Don't use a flash.

Set up the tripod and get the television screen in focus to eliminate unwanted distortion. Next set the exposure to 1/4 second; this long exposure is necessary to eliminate the TV scanning effects.

Use the screen reverse function of VersaWriter to create a bright white screen. With the room completely dark to eliminate glare, set the F stop to bring the light level to its normal reading for proper exposure.

Recall the picture to be photographed from the disk, and without changing any settings, snap the picture. Take another picture one stop up and another one stop down to be safe.

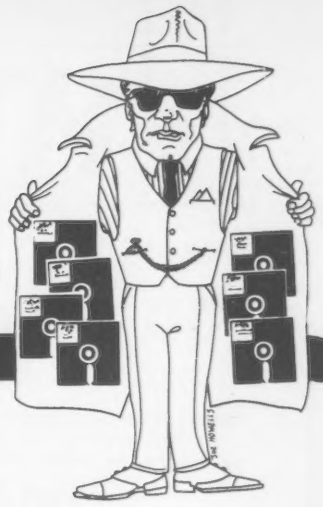
The white screen is used because the light meter averages light from the total area to arrive at the exposure setting. When the actual picture is placed on the screen, the dots are still as bright, but the average light is usually reduced.

Have the film processed in the normal manner. Slides capture the original best because they produce the image with light rather than pigment. So have color blow ups made or, for as little as forty-five or fifty cents, you can color Xerox your slides until you produce a picture you really like. When a computer picture is enlarged, the effects are quite handsome.

I read a recent article which claimed that home computer art is several years away. I disagree! The existing graphic technology—and a little imagination—are sufficient to produce art as valid and personally satisfying as art produced through traditional media.

In fact, I suspect that if the computer had been invented in the fifteenth century, Leonardo da Vinci would have painted the Mona Lisa in lights instead of oils. □

Psst! Wanna deal on some apple® Software...



GREAT SERVICE
GREAT PRICES
WHAT ELSE YOU WANT?

micro mountain

OVER 1,000 ITEMS IN STOCK — STOCK ITEMS SHIPPED SAME DAY — ASK FOR FREE CATALOG

HARDWARE SPECIALS

☐ Smarterm 80 Column board	345.00	Now	289.50
☐ Z-Card (Z-80, CP/M)	279.00	Now	239.50
☐ ALF 9-Voice Card w/Software	199.50	Now	179.50
☐ Low Res Color Monitor	449.00	Now	389.50
☐ RGB Color II Interface	199.00	Now	169.50
☐ Dana Cooling Fan	49.95	Now	42.50
☐ Elephant Diskettes (Box of 10)	39.95	Now	24.50
☐ Hand Controller (Paddles)	29.95	Now	26.50
☐ Numeric Keypad	149.50	Now	139.50
☐ Z-80 Softcard with CP/M	399.95	Now	299.50
☐ CPS Multifunction Card	239.95	Now	189.50
☐ Music System	395.00	Now	339.50
☐ Supertalker	199.00	Now	339.50
☐ NEC 12" Hi-Res Green Monitor	285.00	Now	189.50
☐ NEC 12" Low-Res Color Monitor	495.00	Now	399.50
☐ The Grappler (Specify printer)	149.95	Now	139.50
☐ Lower Case Adapter (New)	49.95	Now	39.50
☐ VERSAcard 4 in 1 card	199.00	Now	179.50
☐ 16k Ramcard	195.00	Now	119.50
☐ Paddle Addapple I/O Port	29.95	Now	25.50
☐ Game Paddles	39.95	Now	32.50
☐ Joystick	59.95	Now	49.50
☐ Expand-a-Port	59.95	Now	49.50
☐ Thunderclock Plus	139.00	Now	129.50
☐ X-10 Ultrasonic Interface	49.00	Now	47.50
☐ Dos Dater Demo Disk	29.95	Now	26.50
☐ Station II	129.95	Now	119.50
☐ Versawriter Graphics Tablet	299.95	Now	279.50
☐ Videoterm 80 Column Card	345.00	Now	279.50

UTILITY PROGRAM SPECIALS

☐ Apple Spice	29.95	Now	24.50
☐ Hi-Res Secrets	124.95	Now	99.50
☐ Dos Boss	24.00	Now	21.50
☐ Utility City	29.50	Now	25.50
☐ Alpha Plot	39.50	Now	34.50
☐ Tip Disk #1	20.00	Now	17.50
☐ The Slide Show	49.95	Now	45.50
☐ 3-D Graphics System	39.95	Now	34.50
☐ Enhanced Graphics Software	59.95	Now	52.50
☐ Roots/M (Geneology program)	159.00	Now	165.50
☐ Home Money Minder	34.95	Now	29.50
☐ Home Accountant	74.95	Now	64.50
☐ Logo Applications Software	179.95	Now	144.50
☐ TASC Compiler	175.00	Now	152.50
☐ Nibbles Away II	69.95	Now	63.50
☐ The Voice	39.95	Now	34.50
☐ Master Diagnostics	50.00	Now	45.50
☐ The Locksmith	99.95	Now	86.50
☐ Lisa Assem. Lang. Dev. Sys	79.95	Now	69.50
☐ Expediter II	99.95	Now	87.50
☐ The Manipulator	34.95	Now	29.50
☐ Complete Graphics System	59.95	Now	52.50
☐ Graphics Magician	59.95	Now	52.50
☐ Special Effects	39.95	Now	33.50
☐ Super Disc Copy	30.00	Now	25.50
☐ Disk Recovery (The Scanner)	30.00	Now	25.50
☐ Dos Plus	25.00	Now	21.50
☐ Back It Up (Nibble Copier)	59.95	Now	52.50
☐ Original Quick Loader	24.95	Now	21.50
☐ E-Z Draw 3.3	49.95	Now	39.50
☐ Data Capture 4.0/80 (Videx)	89.95	Now	75.50
☐ ASCII Express	64.95	Now	61.50
☐ Z-Term (Req CP/M	99.95	Now	92.50
☐ Z-Term Professional (Req CP/M)	149.95	Now	125.50
☐ Speed Star	134.95	Now	119.50
☐ A2-3D Graphics Package	59.95	Now	52.50
☐ Program Line Editor	40.00	Now	32.50
☐ Higher Graphics II	35.50	Now	27.50
☐ Visiterm	100.00	Now	89.50

EDUCATIONAL PROGRAM SPECIALS

☐ Auto Atlas	47.50	Now	41.50
☐ Compu-Math Arithmetic	49.95	Now	39.50
☐ Compu-Math Fractions	39.95	Now	33.50
☐ Compu-Math Decimals	39.95	Now	33.50
☐ Algebra 1	39.95	Now	33.50
☐ Statistics 3.0	29.95	Now	25.50
☐ Spelling Bee w/Reading primer	39.95	Now	34.50
☐ Counting Bee	29.95	Now	24.50
☐ The Vocabulary Game	29.95	Now	25.50
☐ Apple Grade Book	34.50	Now	29.50
☐ Pythagoras and the Dragon	39.95	Now	35.50
☐ Isaac Newton, Fig Newton	49.95	Now	43.50
☐ Master Type	39.95	Now	34.50
☐ Englash SAT #1	30.00	Now	26.50
☐ U.S. Constitution Tutor	30.00	Now	26.50
☐ Typing Tutor II	24.95	Now	22.50
☐ Division Skills	44.95	Now	39.50
☐ Mixed Numbers	44.95	Now	39.50
☐ Vocabulary (Prefix, Suffix, Roots)	44.95	Now	39.50
☐ Punctuation (Commas)	44.95	Now	39.50
☐ Elementary Math Edu-Disk	39.95	Now	36.50
☐ Lisa Educational Sys.	119.95	Now	99.50
☐ Whole Brain Spelling	34.95	Now	29.50

BUSINESS PROGRAM SPECIALS

☐ DBase II (req CP/M 56k version)	795.00	Now	575.50
☐ CPA #1 General Ledger	250.00	Now	199.50
☐ CPA #2 Accounts Receivable	250.00	Now	199.50
☐ CPA #3 Accounts Payable	250.00	Now	199.50
☐ CPA #4 Payroll	250.00	Now	199.50
☐ CPA #5 Property Management	250.00	Now	199.50
☐ The Budget Planner	150.00	Now	125.50
☐ Tax Beater	129.95	Now	105.50
☐ Real Estate Analysis Program	129.95	Now	105.50
☐ Financial Partner	175.00	Now	152.50
☐ Apple Pie (All Versions)	129.95	Now	109.50
☐ Tax Preparer	150.00	Now	135.50
☐ Creative Financing	150.00	Now	135.50
☐ Easy Writer Professional	250.00	Now	199.50
☐ Datadex Data Base Manager	150.00	Now	129.50
☐ Datafactory 5.0	300.00	Now	249.50
☐ The Tax Manager	200.00	Now	179.50
☐ Word Star (Req CP/M)	375.00	Now	275.50
☐ Time Manager	150.00	Now	127.50
☐ Screenwriter II	129.95	Now	109.50
☐ The General Manager	99.95	Now	86.50
☐ Dictionary	99.95	Now	86.50
☐ Executive Secretary	250.00	Now	179.50
☐ Executive Speller	75.00	Now	69.50
☐ Magic Window Word Proc.	99.95	Now	84.50
☐ Magic Mailer	69.95	Now	57.50
☐ Magic Words	69.95	Now	57.50
☐ PFS: Personal Filing Sys.	125.00	Now	108.50
☐ PFS: Personal Report Sys.	95.00	Now	79.50
☐ IFO Database Manager	120.00	Now	105.50
☐ Inventory System 3.3	200.00	Now	174.50
☐ Professional Time Billing	395.00	Now	174.50
☐ Apartment Manager	395.00	Now	349.50
☐ SuperCalc (Req CP/M)	295.00	Now	249.50
☐ D-B Master	229.95	Now	189.50
☐ D-B Utility Pack	99.95	Now	89.50
☐ D-B Utility Pack #2 (May)	99.95	Now	89.50
☐ Visacalc 3.3	250.00	Now	209.50
☐ Visifile	250.00	Now	209.50

GAMES SPECIALS

☐ Eliminator	29.95	Now	25.50
☐ Temple of Apshai	39.95	Now	32.50
☐ Crush, Crumble and Chomp	29.95	Now	24.50
☐ Ricochet	19.95	Now	17.50
☐ Zero Gravity Pinball	29.95	Now	25.50
☐ Game Pack #1	24.00	Now	21.50
☐ Star Blazer	31.95	Now	26.50
☐ Labrinth	29.95	Now	25.50
☐ Dueling Digits	29.95	Now	25.50
☐ Bug Attack	29.95	Now	25.50
☐ Microwave	34.95	Now	28.50
☐ Apple Barrel II (20 Programs)	34.95	Now	29.50
☐ Snack Attack	29.95	Now	24.50
☐ County Fair	29.95	Now	25.50
☐ Swashbuckler	34.95	Now	28.50
☐ Casino	39.95	Now	34.50
☐ The Prisoner	29.95	Now	25.50
☐ Empire I: World Builders	29.95	Now	25.50
☐ Rendezvous (April)	39.95	Now	32.50
☐ Alien Ambush	24.95	Now	19.50
☐ Horizon V	34.95	Now	28.50
☐ Sargon II	34.95	Now	29.50
☐ Reversal (Othello)	34.95	Now	29.50
☐ Zork II	39.95	Now	32.50
☐ Olympic Decathlon	29.95	Now	25.50
☐ Robot Wars	39.95	Now	34.50
☐ A.B.M.	24.95	Now	22.50
☐ Three Mile Island	39.95	Now	34.50
☐ Castle Wolfenstein	29.95	Now	25.50
☐ Wizard and the Princess	32.95	Now	29.50
☐ Hi-Res Soccer	29.95	Now	25.50
☐ Threshold	39.95	Now	35.50
☐ Time Zone	99.95	Now	86.50
☐ Ultima II	54.95	Now	45.50
☐ Marauder	34.95	Now	28.50
☐ Microchess 2.0	24.95	Now	22.50
☐ Gammon Gambler	24.95	Now	22.50
☐ Falcons	29.95	Now	25.50
☐ Star Blaster	29.95	Now	25.50
☐ Congo	32.95	Now	28.50
☐ Fastgammon	24.95	Now	21.50
☐ Beer Run	34.95	Now	29.50
☐ Snake Byte	29.95	Now	25.50
☐ Twerps	34.50	Now	28.50
☐ Kabul Spy	34.95	Now	28.50
☐ Bandits	34.95	Now	28.50
☐ Draw Poker	29.95	Now	24.50
☐ Computer Baseball	39.95	Now	33.50
☐ Tigers in the Snow	39.95	Now	34.50
☐ Computer Air Combat	59.95	Now	49.50
☐ Napoleons Campaign	59.95	Now	49.50
☐ Road to Gettysburg	59.95	Now	49.50
☐ Pursuit of th Graft Spee	59.95	Now	49.50
☐ Flight Simulator	33.50	Now	29.50
☐ Odyssey	30.00	Now	24.50
☐ Adventure to Atlantis	40.00	Now	34.50
☐ Space Raiders	29.95	Now	25.50
☐ Star Dance	24.95	Now	21.50

FREE OFFER

—Your Choice—
Original
Adventure Game
or **Applesoft™ Tutorial**
on disc with
purchase of
Any 3 Programs

DEDUCT 3% if payment accompanies order. WE PAY SHIPPING on all software orders OVER $50 in Continental U.S. (Foreign & Air Extra). ADD $2.50 SHIPPING & HANDLING on orders under $50. CALIF. RESIDENTS ADD 6% SALES TAX. We accept MASTER CARD and VISA. C.O.D.'S ADD $5.00.

NAME _____

STREET _____

CITY _____ STATE & ZIP _____

CARD # _____ EXP. DATE _____

SIGNATURE _____

★ 518 E. ECHO CT., SAN BERNARDINO, CA 92404
Outside Calif. Call (800) 854-5649
Calif. Residents Call (714) 886-0761

Prices Subject to Change without Notice

CIRCLE 186 ON READER SERVICE CARD

The Graph Paper

Part One: Introduction and Explanation

David Lubar

Conspiracy Theory

According to the rumor, there is a big mystery behind Apple graphics, shared by an elite group of programmers who are sworn to secrecy. Such is the myth. And while it is far from true, its origin is understandable.

The instruction manuals have limited room for this sort of information, so the Apple owner who has mastered the information on HPLOT and XDRAW finds, to his dismay, that such techniques are far from adequate to create a fast arcade game. He sees others making the Apple do impossible tricks, and wonders what the secret is.

These "others" have learned through experiment, or through information passed on by friends. Some have taken the time to write a few articles; most are too busy programming.

The purpose of this series is to provide as much information as possible, in an organized fashion, covering every aspect of hi-res graphics. The first few months will cover Applesoft, and amplify areas where the Applesoft manual lacks depth. From there, we'll move into machine language, starting simple but graduating to sophisticated animation. There may be some guest columns or sections from those who are especially strong in a specific area. I'll do what I can.

This month, I just want to cover some of the more common questions and touch on some general concepts.

SHLOAD

There are two or three questions that seem to pop up over and over whenever people discuss graphics. The most frequent question comes from those who started out with tape and then upgraded to disk. They want to know the DOS equivalent of the SHLOAD command (for those of you who have never had to struggle with tape, SHLOAD brings in a shape table, sets up pointers to it, and moves HIMEM below the table). DOS has no such command, but it can load a binary file, which is what a shape table is.

There is a big mystery behind Apple graphics, shared by an elite group of programmers who are sworn to secrecy.

The first step is to put the table on the disk. After booting DOS, use SHLOAD to bring in the table. Next, go into the monitor with CALL -151. Locations E8 and E9 contain the address of the table. To inspect these locations, just type E8.E9 (return).

The two values will be displayed. The address is stored with the lo byte first. So if E8 contains 00 and E9 hold 70, the address of the table will be 7000 (hex). Now you know where the table starts.

The next step is to find where it ends. While still in the monitor, type the address of the table, followed by several returns. A series of numbers will be displayed. The first number tells how many shapes are in the table. Next comes an unused byte, followed by a two-byte offset for each shape. This offset, when added to the original address, will give the address of a shape.

To find the address of the last shape, multiply the number of shapes by two (remember that the value is in hex). Then, add this number to the address at which the table starts, and look at the two bytes at this new address. These contain the offset to the last shape. Add this offset to the starting address of the table and you will finally have the start of the last shape. Type that number and start hitting return. The first 00 you see marks the end of the table (this might seem like a lot to go through, but you'll get used to it).

To put the shape on disk, you need to know the start and length. You already know the start. The length is equal to the end address minus the start, plus one. If you forget to add one, your last byte won't make it to disk. Since this byte marks the end of a shape, its absence would be missed, and might produce some interesting but potentially disastrous results. Anyhow, armed with this knowledge, you save the shape with the command BSAVE filename, A$ start address, L$ length.

Once the table is on disk, you can bring it back with the command BLOAD filename. From inside a program, use 10 PRINT D$; "BLOAD filename" where D$ is control-D. You must also put the address into E8 and E9. Take the lo byte,

David Lubar, 10460 El Mercado Dr., Rancho Cordova, CA 95670.

GraFORTH®

by Paul Lutus

Make Your Graphics Come Alive!

GraFORTH combines sophisticated graphics features with a powerful programming language. Much more than a utility program, GraFORTH's superior graphics make it the ultimate language for entertainment and educational software creation. Included are plotting and line graphics, text display and character image graphics, and high speed 3-D graphics, all with a variety of colors and drawing options. GraFORTH can be used on a 48K Apple][system with DOS 3.3 and one disk drive. A 16K memory card is a useful option.

The Language:

GraFORTH is a graphics language similar in structure to FORTH, but entirely rewritten for ease of use and maximum speed. (Counting to 30,000 in GraFORTH takes less than three seconds!) Immediate commands and programs can be entered and run directly from the keyboard. GraFORTH includes a full set of arithmetic and string handling capabilities. Since standard DOS files are used, communication with other programs and languages is straightforward.

Plotting and Line Graphics:

The first level of graphics consists of plotting points, drawing lines, and filling areas in any of the Apple's high-resolution colors. Lines are drawn much faster than in Basic, and colored lines are never broken. Lines and areas can also be neatly erased from the screen without disturbing other images. Turtle-graphics are included to draw line shapes rapidly at any angle.

Text Display and Character Graphics:

GraFORTH displays both upper and lower case characters. You can use any of the five character sets provided, or create your own with the character editor. Character shapes may be combined to form a single multi-character image, then "block printed" at high speed anywhere on the Apple screen. Characters and character shapes can be drawn in color up to 8 times their normal size.

Three-Dimensional Graphics:

GraFORTH can also draw three-dimensional color images at speeds that make animation possible! Up to sixteen 3-D objects can be manipulated simultaneously. Images can be rotated, scaled, translated, and positioned, with or without perspective. The supplied image editor allows you to create your own 3-D images. Colors may be specified as an image is created, or selected when the image is drawn.

Music:

GraFORTH includes a sophisticated software-based music synthesizer for adding music or sound effects to your programs. Music can be played in any one of several instrument voices.

The System:

Programs written in GraFORTH can be saved to disk as complete stand-alone systems that do not require any additional software to run. This makes GraFORTH the ideal language for developing games and other graphics software.

The Package:

GraFORTH is supplied on a diskette with a special version of DOS 3.3 that loads into a language card (if present), freeing up more memory for your programs. The disk includes many sample image files, utilities, and complete demonstration programs detailing the features of GraFORTH. Included with the disk is a 200-plus page tutorial explaining the ins and outs of GraFORTH. No previous programming experience is necessary to use GraFORTH. See your local Apple dealer for a demonstration today.

insoft®

10175 S.W. Barbur Blvd. / Suite 202B / Portland, OR 97219 / (503) 244-4181

Apple and DOS 3.3 are registered trademarks of Apple Computer, Inc. GraFORTH is a registered trademark of Insoft

CIRCLE 167 ON READER SERVICE CARD

convert it to decimal, and POKE it into 232. POKE the decimal of the hi byte into 233. If you want to protect the table, use a HIMEM statement from Basic. The nice part about having a table on disk is that you can load it anywhere in memory. Just use BLOAD filename, A$ address in hex. And remember to put the new address into E8 and E9.

Multi-Colored Shapes

Another common question also relates to shape tables. People want to know how an arcade game can have multi-colored shapes while a shape from a shape table can only be drawn in a single color.

The answer to this is actually a key to most of this series. Arcade games do not use standard shape tables (though a single shape from a shape table can contain more than one color). While the specifics of advanced shape plotting are too detailed to put in this introduction, I want to cover them briefly now, both to give a taste of what is to come, and to give those of you who are almost there a nudge in the right direction.

Basically, when you put a byte into hi-res memory, it appears as a pattern on the screen. Except for the highest bit, each 1 in the binary value represents an on pixel, each 0 is an off pixel. A dot by itself will have a color; two dots next to each other in a horizontal line will appear white.

Put several bytes across and several down and you have a shape. Erase the bytes and replace them elsewhere and you have animation (actually, there are several ways to animate and they will be covered later).

The problem is getting the bytes in the right places. The hi-res memory is not mapped in a contiguous fashion. And there are certain color restrictions. But it is possible to write a routine that will draw or erase a shape at any location on the screen, and a good portion of future articles will be devoted to such routines.

Many people also wonder whether the shape table routines in the Apple monitor can be used from machine language, and whether they can be used to write arcade games. The good news is that the routines can be used and are fairly easy to implement. The bad news is that, except for certain limited applications, they are still too slow.

There are two problems. First, the routines do a series of calculations to find the correct location for plotting. These calculations take a fair amount of time. Second, the vector method is inherently slow when you are trying to plot full looking shapes. While, for the sake of completeness, this series will cover the ROM routines, you will probably find that you don't want to use them. Once you get a taste of fast animation, nothing else will do.

Details

I realize the above is a bit rambling, but I am 3000 miles from my Apple this month, and didn't want to proceed to the heart of the topic without a chance to verify programs, examples, etc. For now, I just want to cover the scope of the series.

It will start out on a fairly low level, covering graphics from Basic. This part will include information on screen organization, altering images from Basic, and simple animation.

People are sure there is a secret to writing* Raster Blaster *or* Epoch, *and they are right.

Next will come a tour of the ROM routines, which will serve as a stepping off point for machine language. The first few machine language programs will be for manipulating the whole screen. From there, we will go into animation, starting with character graphics, then moving into various methods of full animation. Once animation has been covered for single objects, we'll move to multiple objects.

Other advanced topics will include program flow, timing, integration of graphics with sound, and collision detection. All together, the series should provide enough information to allow anyone to create a complete arcade game.

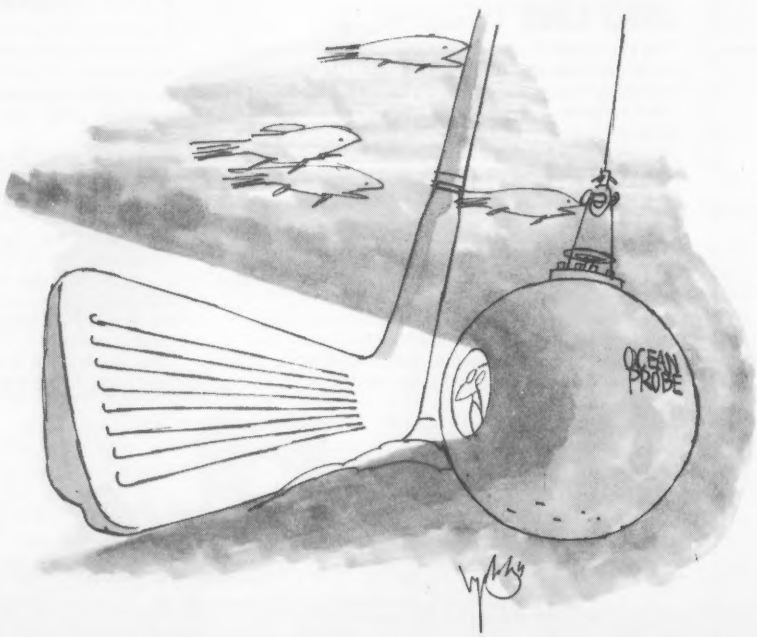
For background, you should understand hex and have some knowledge of machine language. The knowledge of hex is more crucial for the moment. The first few machine code programs will be simple and fully documented, but you will need hex right from the start.

For my part, I will try to cover all the major mysteries of hi-res. For your part, let me know if I miss something. *Creative Computing* will be awarding a copy of *Shape Master* to the person who submits the best question received each month.

As a parting note, I must admit that there is one secret to creating good graphics. People are sure there is a secret to writing *Raster Blaster* or *Epoch*, and they are right. The secret is hard work and practice (I know this sounds preachy, but it's true, and there is no way around it).

Bill Budge wrote many games before *Raster Blaster*, each a bit more sophisticated than the previous one. Take a look at *Penny Arcade*, *Space Album*, and *Trilogy* and you will see what I mean. Larry Miller spent months perfecting his routines for *Epoch*, and the result was worth the time and effort.

You can do it too. I will provide the information, but the rest is up to you. And you might be surprised to find out how much fun this all is. I plan to enjoy myself, and I'm looking forward to this series. See you next month when the fun begins. □



ON-LINE systems
36575 MUDGE RANCH ROAD
COARSEGOLD, CALIFORNIA 93614
PHONE (209) 683-6858

Resumé

the Artist

POSITION:
GRAPHICS and ANIMATION ARTIST
for your APPLE II

SALARY:
$79.95 and I'm yours for life

PROJECT	EMPLOYER	JOB DESCRIPTION
CROSSFIRE	*Jay Sullivan*	*GRAPHICS & ANIMATION Designer*
THRESHOLD	*Warren Schwader*	*ANIMATION Specialist*
TIME ZONE	*ON-LINE*	*GRAPHICS Specialist*
MOUSKATTACK	*Ken Williams*	*GRAPHICS & ANIMATION Designer*

BACKGROUND

I have been with On-Line Systems for almost two years and have dealt with the entire process of graphics development and animation. I would like to share what I have learned with you.

My experience with programming games has given me insights into how the APPLE works. My animation is smooth, and flicker-free. It's also fast (faster than any graphics package now on the market). I can help you make arcade games and educational products that can truly be called "State of the Art".

If your interest is in color graphics, I'm the one for you. I can offer you twenty-one beautiful colors that can paint your screen in seconds. If you've seen the Hi-Res pictures from TIME ZONE, you've seen my work.

You will find me indispensable in many areas. If you want to create a Hi-Res graphics screen on your Apple - no problem! I have many different ways of doing so and even coloring it in. But have you noticed how boring a screen that stands still is? My true forté shows through when you want your screen to come to life. Even Applesoft programmers will be able to use me to create arcade style animation in minutes, painlessly. I have over six different kinds of animation for you and even save you the bother of creating any shapes or tables I might need. Now that I've created your background, drawn your spaceships and got them moving, how about collisions? How do you know when a missile strikes a spaceship? No problem! I'll let you know. And let's not forget my abilities as an educator. Read my documentation and I'll show you things you never thought you'd see.

I also bring with me a large toolbox. I have the editing tools to customize fonts and a zoom lens to do precise dot-by-dot editing. Many of my tools can be used in everyday situations to build bar graphs, draw charts or simply doodle on the Hi-Res screen.

I will work on the 48K APPLE II/II+ with at least one disk drive. You can see my work at your local computer store, or contact me at ON-LINE SYSTEMS.

VISA, MASTERCARD, CHECK, C.O.D.

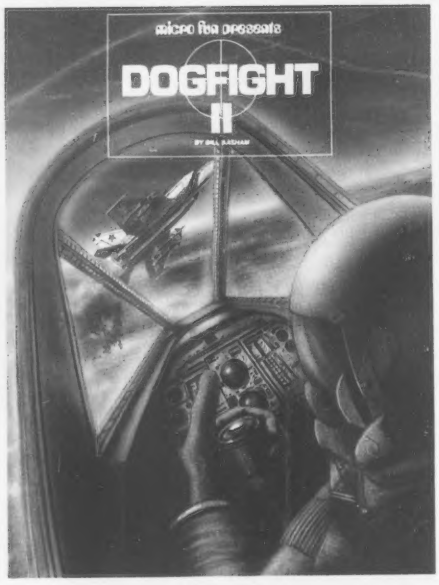
ADD 1 DOLLAR FOR SHIPPING

EXCITING GAMES

FOR THE APPLE* FROM

micro fun

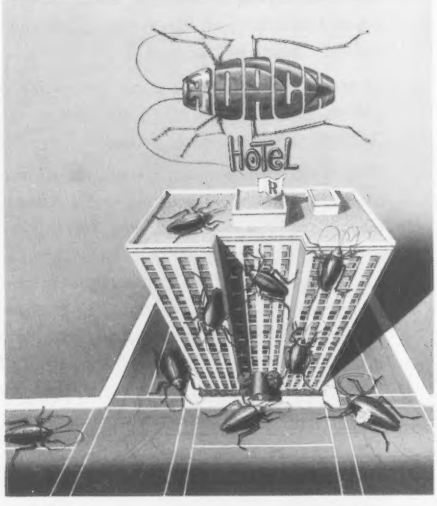
entertainment division of micro lab



DOGFIGHT II. An established classic Arcade game. Set up a game for one to eight players each piloting a jet into combat. Play on one team, two, or against the computor.

PEEPING TOM. Another fast-acting arcade thriller. Shoot various aliens you peep at through windows. It takes perception, luck and skill to defeat the invaders.

In CROWN OF ARTHAIN, you, and another player battle realistic, animated monsters for the crown. Skill and excitement for youngsters under thirteen.



ROACH HOTEL. A high-res, fast-action, arcade game. Stamp out roaches before they take over. Points, bonuses, and additional rounds are earned as your skill increases.

* For Apple II & 48K

Apple is a trademark of Apple Computers, Inc.

48K • APPLESOFT IN ROM • DISK DRIVE

©1982 Micro Lab Inc.

CIRCLE 183 ON READER SERVICE CARD

2310 Skokie Valley Road, Highland Park, IL 60035 • 312-433-7550

Art And The Computer

A Computer Art Course

Batya Friedman

The computer is emerging as a new medium for art. Over the years technological advances, such as printing, photography, film, and oil painting have served to link the worlds of art and technology. Most of these have had a dramatic effect on our conceptions of art.

It is not surprising, therefore, that people now wonder how the computer will challenge our current concepts of art. What new choices will it offer? How will it change the way people think, solve problems and process visual information? How can these changes be communicated to those who are curious but not well versed in art and computer science?

The computer course described here has been offered by Lawrence Hall of Science for the past two years. It allows people who are inexperienced with computers or art to investigate these questions. Participatory activities help them to explore the use of line, depth, curvature and randomness in art; the integration of sound, movement, color and shape; the expression of emotion or concepts; and the communication of information through visual means.

The course begins with some moments of speculation. Without any previous exposure to computers, the students are asked to identify the nature of art pieces that are created on or by a computer. In the past, students have suggested geometric images, images that move as in film, theater and kinetic sculpture, or drawings made from the repetition or variation of image.

Batya Friedman, Lawrence Hall of Science, University of California, Berkeley, CA 94720.

The students are asked to identify the nature of art pieces that are created on or by a computer.

Then, within the context of these speculations, the class members ease into the creation of their first computer art pieces. The students learn the rudiments of graphics on the Atari microcomputer (GR, COLOR, PLOT, and DRAWTO) as they investigate the colors and drawing area available to them.

The grid format of the graphics screen leads readily to the discovery of straight lines and polygons. With these compositional elements and a program (1a) to draw rectangular solids, the students explore the use of color, shape and the relative placement of shapes to create a sense of depth in their drawings.

The computer drawings they create often contain overlapping shapes, bold rectangles, or elements of perspective, somewhat suggestive of the work of the Dutch artist Piet Mondrian or of the American artist Hans Hoffman. (See Figure 1.)

Curves

After working with straight lines, the students are challenged to use their graphic tools (GR, COLOR, PLOT, and DRAWTO) to represent a curve. A box of curved objects such as snail shells, features, batteries, tubes and buttons is on hand to reinforce and expand the students' concepts of curvature. The computer drawings in Figure 2 demonstrate the ingenuity used by some students to solve this problem.

The concept of curvature is further developed with a program (1b) that allows the student to draw rectangles, triangles

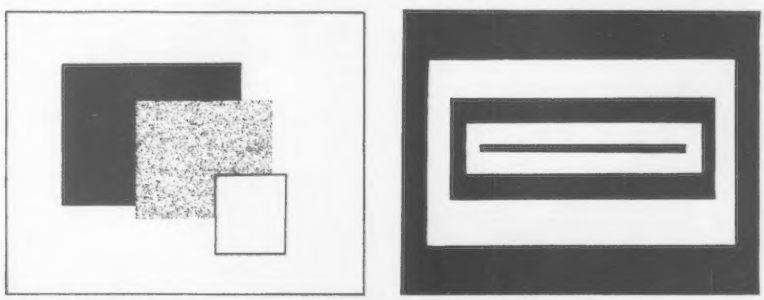


Figure 1. Sample student drawings to create a sense of depth on the computer screen.

and arcs of variable dimensions and colors. Using the program, the student artists work to discover as many different ways to describe a curve as possible.

Randomness

Having drawn lines and curves on the computer, the students are ready to explore the ease with which certain aspects of a drawing can be determined randomly by the computer. For example, a computer artist can compose a drawing of dots on a screen, but allow the computer to place the dots or select the color of the dots randomly.

To facilitate exploration of the random component in their art, students learn about line numbers, GOTO, RUN, LIST and the random (RND) function. Using this knowledge, each student writes a program segment that will generate random images on the screen.

For example, one student may write a program using line numbers 100 to 199 to draw random triangles, and a second student may write a program using line numbers 200 to 299 to draw random boxes.

All the completed program segments are then merged into one larger program and a copy of this composite program is given to each student. With this composite program, students can explore several different random effects in an art piece of their own.

The student controls which program segments are executed, the order in which they are executed, and the length of time each segment is allowed to run. For example, a student might choose to mix the random images from program segments 100-199, 800-899 and 300-399. To do this he sets the computer in a graphics mode and runs each program segment successively by typing: GOTO 100, BREAK, GOTO 800, BREAK, GOTO 300, BREAK. The final image on the screen would be a mixture of the random images created by the individual program segments.

To conclude the activity, the students examine the pieces they have created for artistic content and discuss their feelings as artists when they relinquish control over certain aspects of their drawings.

Sound, Movement, Color and Shape

Students next work to integrate sound, movement, color and shape in a single piece of art. To begin, they investigate representations of movement by creating flashing images or by making images appear gradually on the screen.

They can also achieve a simple form of animation by drawing an image, erasing it, and then redrawing it a small distance away.

Next, they are introduced to the sound (SOUND) capability of the Atari, which includes a scale of 31 semi-tones and silence. With these tools, the students can write programs to control sound, color, shape and movement.

The students are given the task of inventing a new planet, then conveying as much information about it as possible, using only the graphics tools available on the computer.

In the past, the students have generated kinetic patterns of sound and color such as syncopated rhythms reinforced by specific patterns of shapes and colors, musical scores that are interpreted visually on the screen, and random noises that are accompanied by random images.

Having struggled to integrate sound, movement, color and shape in a computer art piece of their own, students now view the work of a professional computer artist, John Whitney. In the films "Experiments in Motion Graphics" (2) and "Arabesque" (2), Mr. Whitney works on a similar problem. He uses computer-generated images that exploit color, shape, movement and sound to express musical concepts such as harmony and counterpoint.

To explore further the relationship between sounds and colored images the students use a silent program (1c) that prints sequential bars of different colors and heights on the screen. The students are asked to listen to a piece of music and simultaneously use this program to represent the music on the screen. Here the opportunity to respond immediately and visually to the sounds encourages the students to use their musical and visual intuitions to formulate a response.

Expressing Emotion

Students are next presented with a task that has challenged artists through the millenia. This task is to express an emotion, such as joy or sorrow, or a concept such as creation. The students can select four of 128 available colors with which they would like to draw (SETCOLOR). Their drawings are as varied as the individuals in the class.

Sample student drawings include sequentially larger bursts of color to represent creation, or flashing lines accompanied by harsh sounds and then followed by a quiet, calm screen to describe a thunderstorm.

In the last part of the course the students use the computer to communicate information visually. First, they attempt to identify several three-dimensional objects from their contour drawings. Then, having become somewhat familiar with this type of drawing, they make several different contour drawings of an object that is in their view. They then look at a series of contour drawings of an imaginary object on the computer screen (1d), and work to construct clay models of the object.

After experiencing the subtleties and ambiguities that arise from attempts to transfer three-dimensional information to the computer screen, the students are given the task of inventing a new planet, and then conveying as much information about it as possible, using only the graphics tools available on the computer. To encourage interaction and collaboration, the students work in small groups of three or four.

In the past, the groups have chosen to represent properties such as the shape of the planet (i.e., square, round, triangular),

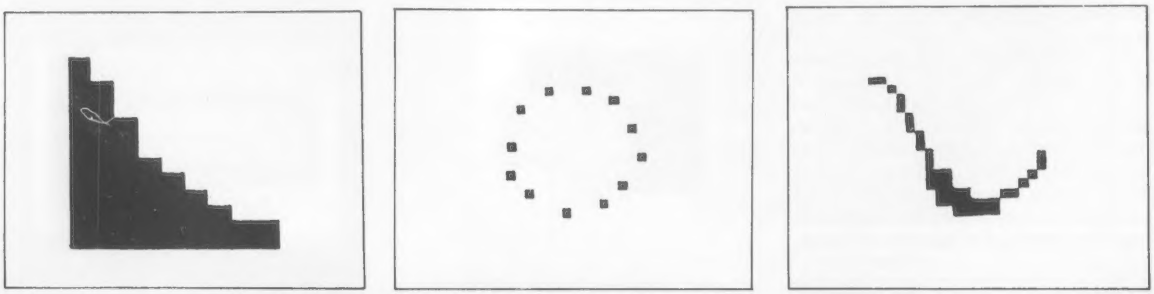


Figure 2. Sample student drawings to represent a curve on the computer screen.

the shape and number of its moons, the temperature gradient on the planet, the distribution of minerals, the atmosphere and the topography.

When the drawings are complete, the students attempt to interpret the physical make-up of each planet from the drawings made by the other groups. The students' drawings can be compared to those created by computers with telemetered signals of Jupiter and Saturn(3). The students can also speculate on the existence and nature of a life form on each of the planets.

Evaluation

In assessing the success of these activities, it is useful to review the goals of the course. These are to have the students identify the challenges that the computer might bring to existing concepts of art; to have them explore the choices that computers can offer to artists; and to have them investigate ways in which the computer might change the way people think, solve problems and process visual information.

There has been no formal evaluation of the course. However, during the course students have raised the following questions: Is a line on a computer screen a piece of art? Of what value is art if you cannot reproduce it? Of what value is art if you cannot control it? Why try to communicate information with a drawing? Why not draw with pencil and paper instead of a computer? How can any image on a television screen express emotion? If we judge that for students to ask and seek answers to these questions reflects at least a partial attainment of the goals, then it seems these activities have been somewhat successful.

Questions or comments about the course are welcome. Please direct them to Batya Friedman, Math and Computer Education Project, Lawrence Hall of Science, University of California, Berkeley, CA 94720. (415)642-3167.

Notes

1. The following programs used in the course are available through the Lawrence Hall of Science:

a. MONDRIAN—Draw rectangular solids of variable dimensions and colors.

b. ARCART—Draw rectangles, triangles, and arcs of variable dimensions and colors.

c. SILENCE—Print sequential bars of different colors and heights.

d. VIEWS—Look at a series of contour drawings of an imaginary object.

2. The films "Experiments in Motion Graphics" and "Arabesque" by John Whitney can be rented from Michigan Media, University of Michigan, A-V Education Center, 416 Fourth St., Ann Arbor, MI 48019.

3. Images of Jupiter and Saturn that have been reconstructed from telemetered signals can be obtained by writing National Aeronautics and Space Administration, Washington, D.C., 20546. Attn: Classroom Education.

Additional Reading

1. Deitrich, Frank and Molnar, Zsuzsa. "Pictures by Funny Numbers," *Creative Computing*, Vol. 7, No. 6, June 1981, pp. 102-107.
2. Ettinger, Linda and Rayala, Martin. "Computers in Art Education," *Computing Teacher*, Vol. 8, No. 4, 1980-81, pp. 24-29.
3. Kolomyjec, William J. "Evolution of an Artist's Tool," *Creative Computing*, Vol. 7, No. 6, June 1981, pp. 62-64.
4. Leavitt, Ruth. *Artist and Computer*, Creative Computing Press, Morristown, New Jersey, 1976. (Out of print.)
5. Noll, A. Michael. "Human or Machine? Aesthetic Preferences for Pseudo-Random Computer-Generated Patterns," *Creative Computing*, Vol. 3, No. 6, November 1977, pp. 96-102.
6. Roads, Curtis. "Interview with Harold Cohen," *Recreational Computing*, Vol. 9, No. 4, January 1981, pp. 4-12.
7. Truckenbrod, Joan R. "Synergism: Artist and Computer," *Creative Computing*, Vol. 7, No. 6, June 1981, pp. 110-111. □

More Workhorse Programs for your computer to play with!

With these Creative Software home programs your Atari® or Vic® can start playing in the real world:

HOUSEHOLD FINANCE
- 15 income & expense categories
- Budgeting
- Monthly & yearly accounting
- Indicate tax deductible items
- Produce tables & graphs
- $34.95 cassette
- $39.95 disk

LOAN ANALYZER
- Amortization tables
- Compute interest charges
- Compare various loans
- Analyze loan terms
- Manipulate loan parameters
- $14.95 cassette
- $19.95 disk

HOME INVENTORY
- Catalog your possessions
- User-definable categories
- Search catalog for items
- Record serial #, purchase price
- Compute the value of items
- $19.95 cassette
- $24.95 disk

DECISION MAKER
- Decide between alternatives
- Compute recommended choices
- Manipulate decision parameters
- Weigh influencing factors
- Save decisions on tape or disk
- $19.95 cassette
- $24.95 disk

CAR COSTS
- Record maintenance costs
- Itemize insurance payments
- Track fuel consumption
- Summarize all costs to date
- Compute cost of a trip
- $19.95 cassette
- $24.95 disk

CREATIVE SOFTWARE
A Division of ASCI, Inc.
201 San Antonio Circle, #270
Mountain View, CA 94040
(415) 948-9595

Ask about our many other recreational and home applications! TO ORDER: VISA/MasterCard, check or money order accepted. If charge, please include expiration date of card. Add $1.50 for shipping and handling. California residents add sales tax.

Halftoning Digital Images

John S. Browning

This tutorial article describes seven halftoning methods for producing digital images. The programming examples are in Fortran. We could easily have translated these to Basic, however, we elected to leave them in Fortran to provide a second level of learning in this tutorial. Fortran has more similarity to Basic than many people have been led to believe.

For example the following Fortran DO loop is easily translated to a Basic FOR loop.

```
   DO 20 J=1021,1024
   G(J)=0
20 CONTINUE

10 FOR J=1021 TO 1024
15 G(J)=0
20 NEXT J
```

Fortran permits DO loop boundaries to be defined by variables or even simple calculations. Basic permits variables, but most do not permit calculations.

```
   DO 20 M=K-1,K+1

10 K1=K-1 : K2=K+1
15 FOR M=K1 TO K2
```

The Fortran logical IF statement is the same as a Basic IF.

```
   IF (G(M,N).LT.T(M,N)) G(M,N)=1
10 IF G(M,N)<T(M,N) THEN G(M,N)=1
```

A Fortran DATA statement can be translated into Basic with either a READ/DATA pair or a series of LET (assign) statements.

```
   INTEGER T(5)
   DATA T/7,9,11,13,15

10 DIM T(5)
15 FOR I=1 TO 5
20 READ T(I)
25 NEXT I
30 DATA 7,9,11,13,15
   or
10 T(1)=7 : T(2)=9 : T(3)=11
15 T(4)=13 : T(5)=15
```

For two-dimensional variables, an implied FOR loop can be imbedded in a data statement. For example,

```
   INTEGER P(2,5)
   DATA (P(1,I), I=1,5)/4,5,6,7,8
   DATA (P (2,I), I=1,5)/13,14,15,16,17

10 DIM P(2,5)
15 FOR I=1 TO 5
20 READ P(1,I), P(2,I)
25 NEXT I
30 DATA 4,13,5,14,6,15,7,16,8,17
```

These hints should permit the subroutines in the article to be converted to Basic.—DHA

Most hobbyist programmers interested in digital image processing are frustrated by the limited range of intensities available on the output devices on which they must display their images. Approaches to solving this problem are called "halftoning methods."

Originally halftoning methods were developed in order to print black and white photographs on paper using one shade of black ink. The objective is to use patterns of black and white to give the impression of intermediate intensities. This is accomplished photographically by using a halftone screen and thresholding. Examples of halftone photographs may be found in most newspapers and magazines.

A similar problem arises when we wish to display a digital image on a bilevel output device. Here something like the analog halftoning is done. A computer is used to generate patterns that can be displayed on the device to give the impression of intermediate intensities.

In this article, I will present seven different halftoning methods, and provide examples of the application of the methods to an image. In the following discussions we will use this notation:

G(X,Y)-gray level of the pixel (picture element) (X,Y)
T - Threshold gray level

John S. Browning, 2071 B. Mercury Dr., Kirtland AFB SE, NM 87118.

Simple Threshold

Using the simple threshold method, if G(X,Y) is less than T, (X,Y) is displayed as black. Otherwise (X,Y) is displayed as white. Figure 1 shows an example of this method.

The simple threshold method fails to show many details present in the image because the decision to display either black or white introduces error.

Figure 1. Simple Threshold Method.

WINE CELLAR

Requires 64k Apple with 3.3 Disc

SUMMER SPECIAL

WINE CELLAR

and

16K RAM CARD

Only $125.00

Limited to supplies on hand.
Cal residents add $7.50

LOOK at wine
Examine your cellar by winery, varietal, vintage and/or region.

DRINK wine
Remove a bottle to drink and change ratings if desired.

ADD wine
Add a new wine to your cellar or change the rating of an old wine.

DISPLAY statistics
Gather and display information about your cellar.

PRINT inventory
Create a hard copy of your cellar's contents and value.

WINE CELLAR is an inventory program for wine buffs. It allows enthusiasts to manage certain information about their wine and manipulate this information from day to day. Up to 400+ unique wine types can be kept on the program diskette alone with 800 additional types on a second disc. Each type can contain up to 2700 cases in the inventory. Graphics are used to provide information about a wine's availability, rating and drinkability. Wild card searches of the cellar provide snapshots of inventory while any particular entry can be looked at in detail. Statistics of the cellar can be displayed and inventories printed.

Price $49.95

Cal residents add $3

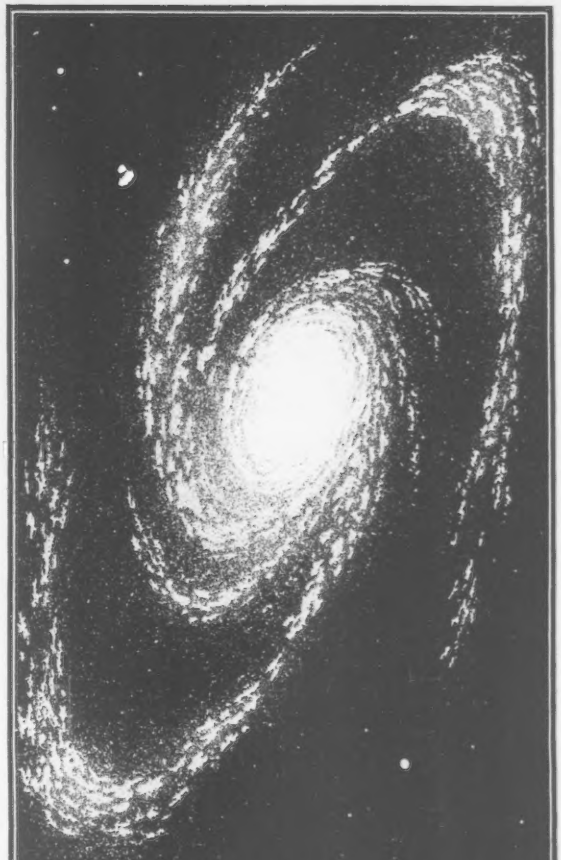
WE Software

800 Greenwich Dr

Chico, CA 95926

*Apple is a registered trademark of Apple Computer Inc.

CIRCLE 256 ON READER SERVICE CARD



FOCUS ON THE GALAXY OF APPLE II* SOFTWARE WITH PEELINGS II

With a galaxy of Apple II software now available it is comforting to know there is a magazine dedicated entirely to software evaluation...Peelings II.

Peelings II provides in-depth, critical but fair reviews of the broad spectrum of Apple II software: business, scientific and educational software; word processors, games and utility programs...you name it.

The truth concerning Apple II software is what Peelings II is all about...can you afford to be without it?

PEELINGS II
THE MAGAZINE OF APPLE SOFTWARE EVALUATION
(Now in its third year of publication)

PEELINGS II
POB 188, Dept. CC
Las Cruces, New Mexico 88004
(505) 526-8364
Dealer Inquires Invited

master charge
VISA

One Year (9 Issues)
$21.00/U.S.
$28.50/Canada, Mexico
$44.00 Foreign

*Apple II is a trademark of Apple Computer Inc.

CIRCLE 211 ON READER SERVICE CARD

Spiral Threshold

With the spiral threshold method, we define an M,N spiral threshold array as follows

black level less than	T(I,I)
T(I,I) less than	T(I,I+1)
T(I,I+1) less than	T(I-1,I+1)
T(I-1,I+1) less than	T(I-1,I)
T(I-1,I) less than	T(I-1,I-1)
T(I-1,I-1) less than	T(I,I-1)

and so on. T(I,I) is the center of T:M,N.

The image is partitioned into M,N subimage arrays, and each component of the subimage array is compared with the corresponding component of the spiral threshold array. If G(I,J) is less than T(I,J), (I,J) is displayed as black. Otherwise (I,J) is displayed as white (Figure 2). In Fortran we have as an example:

```
      SUBROUTINE SPIRAL
      INTEGER T(5,5),G
      COMMON G(1024,1024)
      DATA (T(1,I),I=1,5)/90,100,110,120,130/
      DATA (T(2,I),I=1,5)/80,210,220,230,140/
      DATA (T(3,I),I=1,5)/70,200,250,240,150/
      DATA (T(4,I),I=1,5)/60,190,180,170,160/
      DATA (T(5,I),I=1,5)/50,40,30,20,10/
      DO 10 J=1,204
      L=J*5-2
      DO 10 I=1,204
      K=I*5-2
      DO 10 N=L-2,L+2
      DO 10 M=K-2,K+2
C     BLACK PIXEL
      IF(G(M,N).LT.T(M-K+3,N-L+3)) G(M,N)=1
C     WHITE PIXEL
      IF(G(N,N).GE.T(M-K+3,N-L+3)) G(M,N)=0
   10 CONTINUE
C     ZERO UNUSED PIXELS
      DO 20 J=1021,1024
      DO 20 I=1,1024
      G(I,J)=0
   20 CONTINUE
      DO 30 J=1,1024
      DO 30 I=1021,1024
      G(I,J)=0
   30 CONTINUE
      RETURN
      END
```

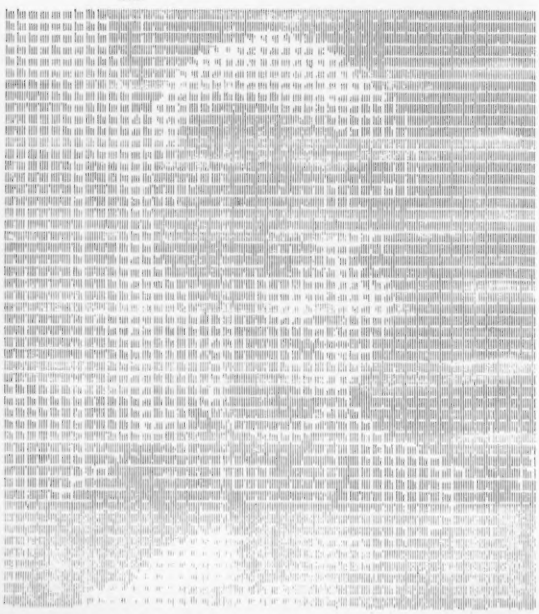


Figure 2. Spiral Threshold Method.

Figure 3. Rectangle Threshold Method.

The spiral threshold method depends on the continuity of the image, i.e., adjacent G(X,Y) are approximately equal. The method produces a "dot" whose size depends on G(X,Y). It is also fairly transparent to abrupt changes in G(X,Y) due to an edge.

Rectangle Threshold

To use the rectangle threshold method, we define a K threshold array where T(K) are fairly randomly distributed and have few factors in common. The image is partitioned into M,N subimage arrays, where MN=K. Each component of the subimage is compared with a selected component of the threshold array. The correspondence between M,N and K is defined to avoid excessive texturing. For example:

```
      SUBROUTINE RECTNGL
      INTEGER T(25),G
      COMMON G(1024,1024)
      DATA T/40,80,140,120,20,60,170,210,190,100,150,
         240,250,230,160,
     .90,200,220,180,150,10,110,130,70,30/
      IB=1
      IT=IB
      DO 10 J=1,1024
      DO 10 I=1,1024
C     BLACK PIXEL
      IF(G(I,J).LT.T(IT)) P(I,J)=1
C     WHITE PIXEL
      IF(G(I,J).GE.T(IT)) P(I,J)=0
C     SELECT T
      IB=IB+1
      IF(IB.GT.25) IB=1
      IT=IB
   10 CONTINUE
      RETURN
      END
```

Like the spiral threshold method, the rectangle threshold method is fairly transparent to abrupt changes in G(X,Y) due to an edge. See Figure 3.

WE AIM TO PLEASE!

Photo: Dimmick's Doubles

WHY PAY MORE?

Professional & Educational Software for

APPLE II APPLE /// TRS-80 TI 99/4

We accept Visa and MasterCard

To place orders or request free brochures, call TOLL FREE

CREATIVE DISCOUNT SOFTWARE
256 So. Robertson, Suite 2156
Beverly Hills, California 90211

Operator No. 831 - 800-824-7888
Alaska/Hawaii 800-824-7919
California 800-852-7777

CIRCLE 146 ON READER SERVICE CARD

INTERNATIONAL
Gran Prix™
by Richard Orban of Riverbank Software, Inc.™

APPLE II* / APPLE II PLUS* / APPLE III* (in emulation mode) 48K, 13 or 16 sector disk

*Apple Computer, Cupertino, CA

$30.00 AT BETTER COMPUTER STORES

RIVERBANK™ Software Inc.

Smith's Landing Road / P.O. Box 128 / Denton, MD 21629 / (301) 479-1312

CIRCLE 228 ON READER SERVICE CARD

FILEMANAGER 800

The Atari 800 Disk-based File Management System

FILEMANAGER 800 is a powerful personal, as well as professional tool. The full use of graphics and sound make FILEMANAGER 800 an extremely easy-to-use file-keeping system.

FILEMANAGER 800 provides:

- *User-defined formats*
- *Index on any field at any time*
- *Ultra fast sort*
- *Wild card search*
- *Up to 2000 characters per record*
- *Full screen input and edit*
- *Search on any combination of fields*
- *Format lists and mailing labels*
- *Single keystroke commands*
- *Full mathematical capability*
- *Computed, constant, and dollar fields*
- *Combine and convert existing files*
- *Elegant human engineering*
- *Database merge with Datasoft's Text Wizard*
- *Exclusive Datalock T.M. electronic key protection*
- *Compatable with Axlon's 128K Ramdisk*
- *And much, much more . . .*

Use FILEMANAGER 800 to create mailing lists, inventory and business records, customer lists all customized to your own needs!

Requires 40K and a disk drive

synapse

820 Coventry Road
Kensington, CA 94707
(415) 527-7751

FILEMANAGER 800 is a trademark of SYNAPSE SOFTWARE

Atari is a registered trademark of Atari, Inc.

CIRCLE 251 ON READER SERVICE CARD

Random Modulation

In random modulation, a pseudo random number generator produces a signal which is used to modulate G(X,Y). If G(X,Y) + T*(1 - 2*R) is less than T, (X,Y) is displayed as black. Otherwise (X,Y) is displayed as white. The output of the random number generator is R and is between zero and one with a mean of 0.5. In the example (Figure 4), the random number generator is S = FRAC(S + pi)**5, where the seed is 0.192743568.

The random modulation method introduces "salt and pepper" noise into the display, which may be unacceptable.

Sinusoidal Modulation

In sinusoidal modulation the function SIN(A*X) * SIN(B*Y) is used to modulate G(X,Y). If G(X,Y) + T*SIN(A*X)*SIN(B*Y) is less than T, (X,Y) is displayed as black. Otherwise (X,Y) is displayed as white.

The sinusoidal modulation method is similar to the spiral threshold technique. The modulation constants, A and B, are chosen to avoid excessive texturing. In the example (Figure 5) the modulation constants are pi/3.

Figure 4. Random Modulation Method.

"Look, you said you'd help me load my program!"

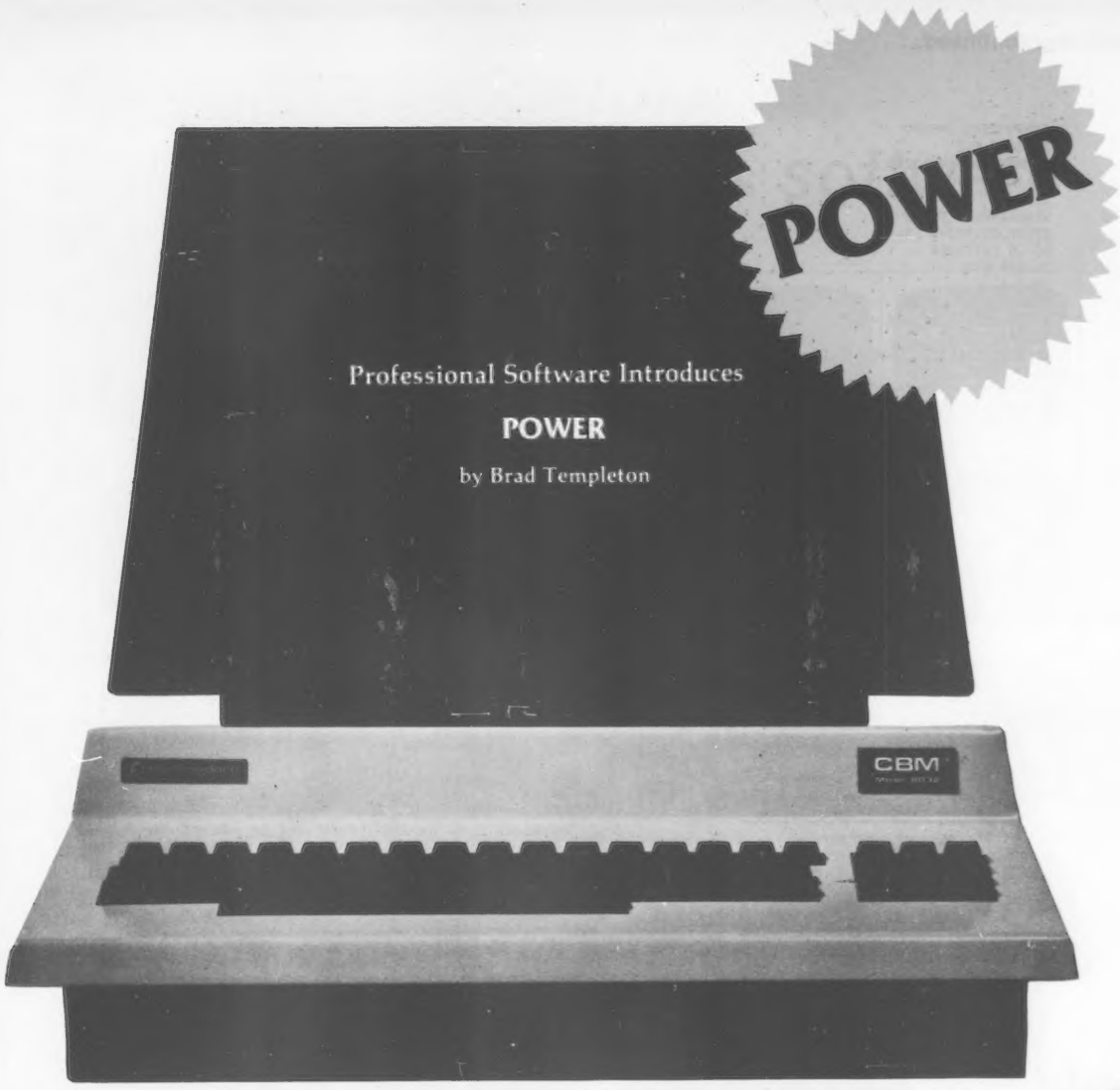
Error Distribution

The error distribution method records the error that will be introduced by simple thresholding and distributes the error to adjacent pixels. Odd structures are introduced into the display as the error is propagated through the image.

In the example (Figure 6), the error is distributed as follows: 3/8 to the right of (X,Y), 3/8 below (X,Y) and 1/4 down the diagonal.

Figure 5. Sinusoidal Modulation Method.

Figure 6. Error Distribution Method.



ADD POWER TO YOUR COMMODORE COMPUTER

$89.95

POWER produces a dramatic improvement in the ease of editing BASIC on Commodore's computers. POWER is a programmer's utility package (in a 4K ROM) that contains a series of new commands and utilities which are added to the Screen Editor and the BASIC Interpreter. Designed for the CBM BASIC user, POWER contains special editing, programming, and software debugging tools not found in any other microcomputer BASIC. POWER is easy to use and is sold complete with a full operator's manual written by Jim Butterfield.

POWER's special keyboard 'instant action' features and additional commands make up for, and go beyond the limitations of CBM BASIC. The added features include auto line numbering, tracing, single stepping through programs, line renumbering, and definition of keys as BASIC keywords. POWER even includes new "stick-on" keycap labels. The cursor movement keys are enhanced by the addition of auto-repeat and text searching functions are added to help ease program modification. Cursor UP and cursor DOWN produce **previous** and next lines of source code. COMPLETE BASIC program listings in memory can be displayed on the screen and scrolled in either direction. POWER is a must for every serious CBM user.

Call us today, for the name of the Professional Software dealer nearest you.

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
Tel: (617) 444-5224 Telex #951579

CIRCLE 217 ON READER SERVICE CARD

```
      SUBROUTINE ERRORD
      INTEGER G,T
      COMMON G(1024,1024),T
      DO 10 I=1,1024
      IP=I+1
C     WRAP-AROUND ERROR
      IF(IP.GT.1024) IP=1
      DO 10 I=1,1024
      J=1024-K+1
      JM=J-1
C     WRAP-AROUND ERROR
      IF(JM.LT.1) JM=1024
C     BLACK=0
      IF(G(I,J).LT.T) ERROR=G(I,J)
C     WHITE=255
      IF(G(I,J).GE.T) ERROR=G(I,J)-255
C     DISTRIBUTE ERROR TO RIGHT
      G(IP,J)=G(IP,J)+3.*ERROR/8.
C     DISTRIBUTE ERROR BELOW
      G(I,JM)=G(I,JM)+3.*ERROR/8.
C     DISTRIBUTE ERROR DOWN DIAGONAL
      G(IP,JM)=G(IP,JM)+ERROR/4.
   10 CONTINUE
      RETURN
      END
```

The above is followed by a simple threshold code module.

Pattern

The pattern technique uses K+1 arrays of K x K dots to display K+1 levels of gray. For I between zero and K, K-I of the KK dots are black and I are white. Patterns are chosen to avoid excessive texturing when they are placed next to each other. K+1 is most often 10, as ten levels of gray are needed to display most natural images (Figure 7).

```
      SUBROUTINE PATTERN
      INTEGER P(10,9),G,T
      COMMON G(1024,1024)
      DATA (P(1,I),I=1,9)/9*0/
      DATA (P(2,I),I=1,9)/4*0,1,4*0/
      DATA (P(3,I),I=1,9)/4*0,2*1,3*0/
      DATA (P(4,I),I=1,9)/0,1,2*0,2*1,3*0/
      DATA (P(5,I),I=1,9)/0,1,0,3*1,3*0/
      DATA (P(6,I),I=1,9)/0,1,0,3*1,0,1,0/
      DATA (P(7,I),I=1,9)/0,1,0,5*1,0/
      DATA (P(8,I),I=1,9)/0,7*1,0/
      DATA (P(9,I),I=1,9)/8*1,0/
      DATA (P(10,I),I=1,9)/9*1/
      DO 10 I=1,341
      K=I*3-1
      DO 10 J=1,341
      L=J*3-1
      T=G(K,L)/26
      DO 10 M=K-1,K+1
      DO 10 N=L-1,L+1
   10 G(M,N)=P(10-T,M-K+2+3*(N-L+1))
C     ZERO UNUSED PIXELS
      J=1024
      DO 20 I=1,1024
      P(I,J)=0
   20 CONTINUE
      I=1024
      DO 30 J=1,1024
      P(I,J)=0
   30 CONTINUE
      RETURN
      END
```

Conclusion

Figures 1 through 7 are examples of applications of the halftoning methods discussed above. The resolution of the images is low to better illustrate the differences in the methods. Many other halftoning methods have been developed to cope with special situations; consult the references for additional information.

Figure 7. Pattern Method.

Acknowledgement

Some classroom materials from the digital image processing course taught by the Department of Electrical and Computer Engineering of the University of New Mexico were used in the preparation of this article. □

References

J. F. Jarvis, C. N. Judice and W. H. Ninke, "A Survey of Techniques for the Display of Continuous-tone Pictures of Bilevel Displays," *Computer Graphics Image Proc.*, 5, 1976.

R. J. Klensch, "Electronically Generated Halftone Pictures," *RCA Review*, Sept. 1970.

P. G. Roetling, "Halftone Method with Edge Enhancement and Moire Suppression," *J. Opt. Soc. Amer.*, 66, 10, Oct. 1976.

R.L. Gard, "Digital Picture Processing Techniques for the Publishing Industry," *Computer Graphic Image Proc.*, 5, 1976.

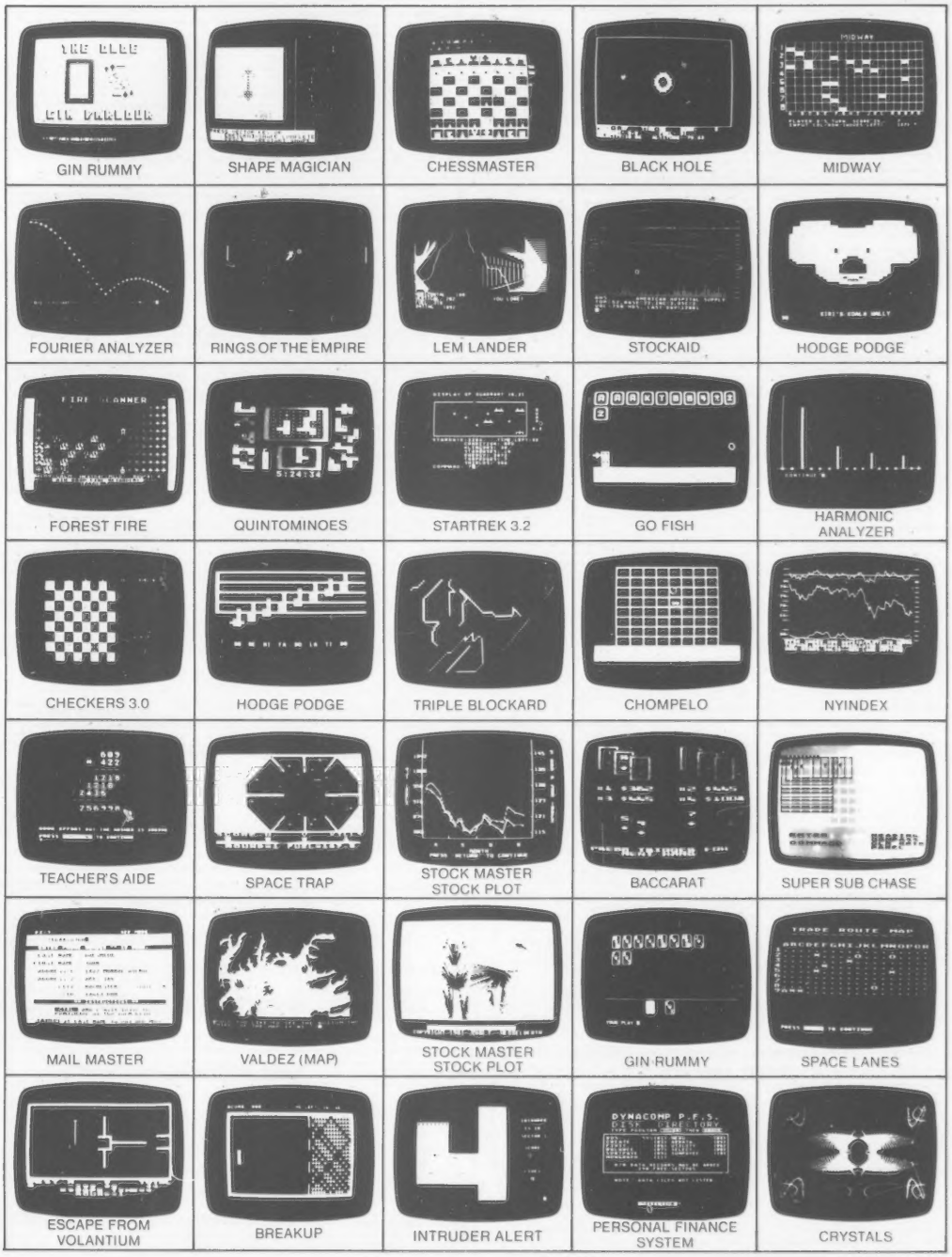
C. N. Judice, J. F. Jarvis and W. H. Ninke, "Using Ordered Dither to Display Continuous Tone Pictures," *Proc. SID*, 15, 4, 1974.

J. F. Jarvis and C. S. Roberts, "A New Technique for the Bilevel Redition of Continuous-tone Pictures," *IEEE Trans. on Comm.*, 1976.

C. N. Judice, "Dithervision—A Collection of Techniques for Displaying Continuous Tone Still and Animated Pictures on Bilevel Displays," *SID*, Washington, D.C., 1975.

R. W. Floyd and L. Steinberg, "An Adaptive Algorithm for Spatial Gray Scale," *Proc. SID*, 17, 2, 1976.

It's hard to picture all of DYNACOMP's *software*



(c) 1982 PROMEDIA ASSOCIATES

TURN TO NEXT PAGE....

CIRCLE 154 ON READER SERVICE CARD

DYNACOMP

Quality software for:*

ATARI
PET/CBM
APPLE II Plus
OSBORNE-1
ALTAIR**

TRS-80 (Level II)**
NORTH STAR***
CP/M Disks/Diskettes
(See Availability box MBASIC/CBASIC)
SUPERBRAIN****

CARD GAMES

BRIDGE MASTER (North Star only) — **Price: $21.95 Diskette**
If you liked DYNACOMP'S BRIDGE 2.0, you will absolutely love BRIDGE MASTER. BRIDGE MASTER is a comprehensive bridge program designed to provide hours of challenging competition. Bidding features include the Blackwood convention, Stayman convension, pre-emptive openings, and recognition of demand bids and jump-shift responses. After playing a specific hand, you may replay the same hand, with the option of switching cards with your computer opponents. This feature allows you to compare your bidding and playing skills to BRIDGE MASTER. Bonuses for game contracts and slams are awarded as in duplicate bridge. Doubled contracts are scored based upon a computer assigned vulnerability. A score card is displayed at the conclusion of each hand. The score card displays a summary of total hands played, total points scored, number of contracts made and set, and % bids made. BRIDGE MASTER is clearly the best computer bridge program available.
DYNACOMP'S previous BRIDGE 2.0 customers may upgrade to BRIDGE MASTER for a nominal charge of $5.00 plus postage and handling (see ordering information box).

BACCARAT (Atari only) — **Price: $18.95 Cassette /$22.95 Diskette**
This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.

GIN RUMMY (Apple diskette only) — **Price: $22.95 Diskette**
This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?

POKER PARTY (Available for all computers) — **Price: $17.95 Cassette /$21.95 Diskette**
POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple cassette and diskette versions require a 32 K (or larger) Apple II.

GO FISH (Available for all computers) — **Price: $14.95 Cassette /$18.95 Diskette**
GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children!

BLACKJACK COACH (32K TRS-80 only) — **Price $29.95 Cassette /$33.95 Diskette**
BLAGKJACK COACH is both a game and an educational tool. With this program you may quantitatively test standard and special playing and betting methods, including the several card count schemes. You can simply play, play with the computer as a coach, or statistically test your method under long run automatic play. All the standard player choices are included: insurance, splitting pairs, double downs and surrender (optional). The computer analyzes the technique and provides detailed summary reports which statistically pinpoint the strengths and weaknesses of your play. Don't risk your money at the tables until you have practiced with BLACKJACK COACH!

THOUGHT PROVOKERS

MANAGEMENT SIMULATOR (Atari, North Star, OSBORNE and CP/M only) — **Price: $19.95 Cassette $23.95 Diskette**
This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufacturers three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.

FLIGHT SIMULATOR (Available for all computers) — **Price: $17.95 Cassette /$21.95 Diskette**
A realistic and extensive mathematical simulation of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real airfoil. You can practice instrument approaches and navigation using radials and compass headings. The more advanced flyer can also perform loops, half-rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS. Runs in 16K Atari.

VALDEZ (Available for all computers) — **Price: $15.95 Cassette /$19.95 Diskette**
VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 × 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software reviews in 80 Software Critique and Personal Computing.

BACKGAMMON 2.0 (Atari, North Star, OSBORNE and CP/M only) — **Price: $14.95 Cassette /$18.95 Diskette**
This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

CHESS MASTER (North Star and TRS-80 only) — **Price: $19.95 Cassette /$23.95 Diskette**
This complete and very powerful program provides five levels of play. It includes castling, en passant captures and the promotion of pawns. Additionally, the board may be preset before the start of play, permitting the examination of "book" plays. To maximize execution speed, the program is written in assembly language (by SOFTWARE SPECIALISTS of California). Full graphics are employed in the TRS-80 version, and two widths of alphanumeric display are provided to accommodate North Star users. See review in onComputing.

FOREST FIRE! (Atari only) — **Price: $14.95 Cassette /$18.95 Diskette**
Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

BLACK HOLE (Apple only) — **Price: $14.95 Cassette /$18.95 Diskette**
This is an exciting graphical simulation of the problems involved in closely observing a black hole with a space probe. The object is to enter and maintain, for a prescribed time, an orbit close to a small black hole. This is to be achieved without coming so near the anomaly that the tidal stress destroys the probe. Control of the craft is realistically simulated using side jets for rotation and main thrusters for acceleration. This program employs Hi-Res graphics and is educational as well as challenging.

SPACE EVACUATION! (Apple, Atari and TRS-80 only) — **Price: $15.95 Cassette /$19.95 Diskette**
Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.

MONARCH (Atari only) — **Price: $11.95 Cassette /$15.95 Diskette**
MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.

CHOMPELO (Atari only) — **Price: $11.95 Cassette /$15.95 Diskette**
CHOMPELO is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system.

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II) and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC or CBASIC (for example, Altos, Xerox 820 and many others). 5¼" CP/M diskettes are available for the North Star and Osborne computer systems.

*ATARI, PET/CBM, NORTH STAR, CP/M, IBM, OSBORNE, SUPERBRAIN and XEROX are registered tradenames and/or trade marks.

**Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER. TRS-80 diskettes are not supplied with either DOS or BASIC.

***For most North Star disk-based systems. DYNACOMP presently does not support the new North Star Advantage.

****For Altair systems having Microsoft BASIC.

*****For SUPERBRAIN systems running under MBASIC or CBASIC (state which).

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly service
- Free catalog
- Toll free order phone

AND MORE...

STARTREK 3.2 (Available for all computers) — **Price: $11.95 Cassette /$15.95 Diskette**
This is the classic Startrek simulation, but with several new features. For example, the Klingons now shoot at the Enterprise without warning while also attacking starbases in other quadrants. The Klingons also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Enterprise is besieged by three heavy cruisers and a starbase S.O.S. is received! The Klingons get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

LIL' MEN FROM MARS (Atari only) — **Price: $19.95 Cassette /$23.95 Diskette**
Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.

SPACE TILT (Apple and Atari only) — **Price: $10.95 Cassette /$14.95 Diskette**
Use the game paddles to tilt the plane of the TV screen to "roll" a ball into a hole in the screen. Sound simple? Not when the hole gets smaller and smaller! A built-in timer allows you to measure your skill against others in this habit-forming action game.

ESCAPE FROM VOLANTIUM (Atari only) — **Price: $15.95 Cassette /$19.95 Diskette**
Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTIUM! To escape you must maneuver your space ship around obstacles and laser blast the dragon (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new dragon appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and dragons appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.

ALPHA FIGHTER (Atari only) — **Price: $12.00 Cassette /$16.95 Diskette**
Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only) — **Price: $14.95 Cassette /$18.95 Diskette**
The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only) — **Price: $14.95 Cassette /$18.95 Diskette**
This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

MIDWAY (Atari only) — **Price: $14.95 Cassette /$18.95 Diskette**
MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.

TRIPLE BLOCKADE (Atari only) — **Price: $14.95 Cassette /$18.95 Diskette**
TRIPLE BLOCKADE is a two-to-three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari joysticks, the object is to direct your blockading line around the screen without running into your opponent(s). Although the concept is simple, the combined graphics and sound effect lead to "high anxiety".

GAMES PACK I (Available for all computers) — **Price: $10.95 Cassette /$14.95 Diskette**
GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSERACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers) — **Price: $10.95 Cassette /$14.95 Diskette**
GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.

Why pay $7.95 or more per program when you can buy a DYNACOMP collection for just $10.95?

MOON PROBE (Atari and North Star only) — **Price: $11.95 Cassette /$15.95 Diskette**
This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.

SPACE TRAP (Atari only, 16K) — **Price: $14.95 Cassette /$18.95 Diskette**
This galactic "shoot'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.

CHIRP INVADERS (PET/CBM only) — **Price: $14.95 Cassette /$18.95 Diskette**
CHIRP INVADERS is an addictive game using action graphics. A Federation space station must be reached before the Chirps conquer the Earth. Stationary obstacles, moving meteors, and the attacking Chirps must all be avoided for a successful journey. Good luck.

SUPER SUB CHASE (Atari only) — **Price: $19.95 Cassette /$23.95 Diskette**
SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.

ADVENTURE

CRANSTON MANOR ADVENTURE (North Star and CP/M only) — **Price: $19.95 Diskette**
At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette. Not available in 5¼" CP/M format.

GUMBALL RALLY ADVENTURE (North Star only, 48K) — **Price: $11.95 Diskette**
Take part in this outlaw race from the east coast to the west coast. The goal is to find your way to the finish line while maintaining the highest possible speed. You may choose one of five cars available at the garage. The choice will affect your speed and range. Remember to take spare parts and don't get caught speeding!

UNCLE HARRY'S WILL (North Star only, 40K) — **Price: $24.95 Diskette**
Uncle Harry has died and has left you everything. However, he has neglected to mention where everything is! Instead, his will consists of a poem which contains clues. You will have to travel all over the United States both by car and on foot to solve the puzzle, and there are over 300 locations to probe. Be careful and watch out for red herrings!

SPEECH SYNTHESIS

DYNACOMP is now distributing the new and revolutionary TYPE-'N-TALK™ (TNT) speech synthesizer from Votrax. Simply connect TNT to your computer's serial interface, enter text from the keyboard and hear the words spoken. TNT is the easiest-to-program speech synthesizer on the market. It uses the least amount of memory and provides the most flexible vocabulary available anywhere!

TYPE-'N'-TALK List price $375. DYNACOMP'S price $319.95 plus $5.00 for shipping and handling.

TALK TO ME (T'N'T Atari only, 24K) — **Price: $14.95 Cassette /$18.95 Diskette**
This program presents a superb tutorial on speech synthesis using the Atari 800 and TYPE 'N TALK™. TALK TO ME will illustrate normal word generation as well as phoneme generation. The documentation includes many helpful programming tips. TALK TO ME has been demonstrated on network (CBS) TV!

MISCELLANEOUS

CRYSTALS (Atari only) — **Price: $ 9.95 Cassette /$13.95 Diskette**
A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K Atari.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY
DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.
Price: $9.95 each/$7.95 each (4 or more)
The complete collection may be purchased for $149.95

5¼" DISKETTES (soft sectored/ten sectored) — **Price: $39.95/20 Diskettes**
As you might imagine, DYNACOMP purchases diskettes in large quantities and at wholesale prices. We want to pass the savings along to you!

BUSINESS and UTILITIES

NEW **MAILMASTER (Atari diskette only)** — Price: $39.95 Diskette
MAILMASTER is a very versatile software package for managing and manipulating mail lists and mini data bases. Each disk can hold over 600 customer entries containing name, address, 38 letter key words and a phone number. The display is marked so that entries may be made and edited with ease. The status (e.g., disk space left, options, etc.) is shown at all times. Labels may be printed 1,2 or 3 up, and all sorting (zip code and alphabetic) is performed by a fast machine language program.

PERSONAL FINANCE SYSTEM (Atari and North Star only) — Price: $39.95 Diskette
PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payee, and display information on expenditures by any of 26 user defined codes by month or by payee. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

FAMILY BUDGET (Apple and Atari only) — Price: $34.95 Diskette
FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

INTELINK (Atari only) — Price: $49.95 Diskette
This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a *very* smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time-share commands and programs, and the Atari will transmit them as needed; batch processing. All this adds up to saving both connect time and your time.

NEW **PAYFIVE (Apple II plus diskette, two drives required)** — Price: $149.95
This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and compiles the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes *many* other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for $30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) — Price: $12.95 Cassette/$16.95 Diskette
SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

TAX OPTIMIZER (North Star only) — Price: $59.95 Diskette
The TAX OPTIMIZER is an easy-to-use, menu oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is tax deductible!

NEW NEW **UTIL (Apple only, 48K)** — Price: $19.95 Diskette
UTIL is a disk-oriented utility system which permits examining and changing of the contents of DOS 3.2 and 3.3 diskettes at the bit (nibble or byte) level. With UTIL you can easily examine the contents of a diskette sector by sector, restructure the sector pointers, reallocate sectors (e.g. bad sectors may be "hidden"), and perform many other sophisticated operations. For the experienced programmer.

NEW NEW **TURNKEY AND MENU (Atari only)** — Price: $17.95 Diskette
TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU. MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

NEW NEW **STOCKAID (Atari only)** — Price: $29.95 Diskette
STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long (term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 239 days × 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

NEW NEW **SHAPE MAGICIAN (Apple II, 48K, diskette only)** — Price: $29.95
At last! An utility for painlessly creating graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

EDUCATION

HODGE PODGE (Apple only, 48K Applesoft or Integer BASIC) — Price: $14.95 Cassette/$18.95 Diskette
Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

NEW **TEACHERS' AIDE (Atari only)** — Price: $13.95 Cassette/$17.95 Diskette
TEACHERS' AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

NEW NEW **PHARMACOLOGY UPDATE (PET only)** — Price: $169.95 Cassette/$149.95 Diskette
This is DYNACOMP's first educational software entry for the medical profession (more are coming!). PHARMACOLOGY UPDATE was written by a R.N. as a masters project, with the aid of a practicing pharmacologist and an electronics instructor. This package comes in two parts. The first part is a 200 page manual which is divided into 11 sections. Each of these sections provides both concise information and probing questions. The second part consists of 11 programs that are keyed to the text and which test the degree of your understanding of the text material. This package has great educational value for the beginning student as well as the professional interested in an efficient way to review and update his or her knowledge. Available on cassette: (11) or diskette.

NEW **TEACHER'S GRADEBOOK (Apple 48K dual/single drive)** — Price $49.95 Diskette
TEACHER'S GRADEBOOK is a *complete* password protected record-keeping system for the classroom. It supports up to nine users, and each user may have data for up to nine classes on one disk (with up to 90 students per class). Typical information which can be entered, edited and processed includes rosters, absences and grades. Summary reports may be displayed (on the screen) or printed in various ways, with automatic weighted averaging and conversion to letter grades. This system has been tested ("goof-proofed") in the class environment and is both well-written and well-documented.

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charges
Within North America: Add $2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs. Dealer discount schedules are available upon request.

8" CP/M Disks
Add $2.50 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5¼" CP/M Disks
All software available on 8" CP/M disks is also available on 5¼" disks, North Star and Osborne format.

Ask for **DYNACOMP** programs at your local software dealer. Write for detailed descriptions of these and other programs from **DYNACOMP**.

DYNACOMP, Inc. (Dept. C)
1427 Monroe Avenue
Rochester, New York 14618
24 hour message and order phone: (716)442-8731
Toll free order phones: (800)828-6772
(800)828-6773
Office phone (9AM-5PM EST): (716)442-8960

VISA MasterCard

New York State residents please add 7% NYS sales tax.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) — Price: $39.95 Cassette/$43.95 Diskette
DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be used. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHER (Not available for Atari) — Price: $19.95 Cassette/$23.95 Diskette
This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette
Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) — Price: $19.95 Cassette/$23.95 Diskette
This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) — Price: $24.95 Cassette/$28.95 Diskette
HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of $51.95 (three cassettes) and $63.95 (three diskettes).

REGRESSION I (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette
REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing; automatic data, curve and residual plotting; a statistical analysis (eg: standard deviation, correlation coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (PARAFIT) (Available for all computers) — Price: $19.95 Cassette/$23.95 Diskette
PARAFIT is designed to handle those cases in which the parameters are imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers) — Price: $24.95 Cassette/$28.95 Diskette
MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for $51.95 (three cassettes) or $63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM) — Price: $39.95 Cassette/$43.95 Diskette
In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2K-P factorial designs. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)
DYNACOMP is the exclusive distributor for the software keyed to the popular texts *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: $14.95 Cassette/$18.95 Diskette

All three collections are available for $39.95 (three cassettes) and $49.95 (three diskettes).

Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economization, inversion, reversion, shifting, etc.).
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, LaGrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: $14.95 Cassette/$18.95 Diskette

All eight collections are available for $99.95 (eight cassettes) and $129.95 (eight diskettes).
Because the texts are a vital part of the documentation, *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* are available from DYNACOMP:

BASIC SCIENTIFIC SUBROUTINES, Vol 1 (319 pages): $19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol 2 (790 pages): $23.95 + $1.50 postage

See reviews in KILOBAUD and Dr. Dobbs.

NEW NEW **SOFTNET (Apple II, 48K, diskette only)** — Price $129.95
SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

NEW NEW **MATCHNET (TRS-80 only)** — Price: $19.95 Cassette/$23.95 Diskette
It often takes days to iteratively optimize an L, Pi or T matching network for a particular application. Take a few minutes with MATCHNET and you will have the Q, frequency response and reflection coefficients for any of twelve matching networks. You input the source and load impedance and MATCHNET calculates the R, C, (and L) values and plots (and/or prints) the frequency response and reflection coefficients for each configuration. The reviewer of this program remembers when he use to do this by hand and loves MATCHNET!

NEW NEW **ACTIVE CIRCUIT ANALYSIS (ACAP) (48K Apple only)** — Price: $28.95 Cassette/$29.95 Diskette
With ACAP you may analyze the response of an active or passive component circuit. The circuit may be probed at equal steps in frequency, and the resulting complex voltages at each component juncture examined; the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library.

NEW NEW **LOGIC SIMULATOR (Apple only; 48K RAM)** — Price: $24.95 Cassette/$28.95 Diskette
Test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple input AND, OR, NOR, EXOR, EXNOR and NAND gates, as well as inverters, J-K and D flip-flops, and one-shots. Inputs may be clocked in with varying clock cycle lengths/displacements and delays may be introduced to probe for glitches and race conditions. A timing diagram for any given set of nodes may be plotted using HIRES graphics. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR.

NEW NEW **NUMBERKRUNCHER (TRS-80 only)** — Price: $69.95 Cassette/$73.95 Diskette
This program is the most complete numerical analysis system available for the TRS-80. It can handle up to 255 data sets, each set having a six character name. It includes complete data editing facilities and convenient data input/output capability. The analyses available are multiple linear regression and correlation determination of residuals, data transformations and extensive graphics generation, including axis naming, and more. The supporting documentation is extremely well written and well organized, and includes appendices which describe the numerical procedures used in the program.

NEW NEW **STATSORT (TRS-80 only)** — Price: $39.95 Cassette/$43.95 Diskette
STATSORT consists of several menu selected programs which allow the user to create (build, edit, merge), format and print files, (machine) sort them on any field, and numerically analyze (maximum, minimum, average, variance, standard deviation) tabulated data. STATSORT is well documented and easy to use. The cassette version can also be employed to create a data, type which can be read by the Radio Shack Advanced Statistical Package.

NEW NEW **STATTEST (TRS-80 only)** — Price: $19.95 Cassette/$23.95 Diskette
This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation and regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

CIRCLE 154 ON READER SERVICE CARD

a graphics package for the apple II

Christopher Hansen

The Apple II computer is a very powerful graphics instrument, but many of its graphics capabilities are difficult to use because of the software that comes with the Apple. For example, I find it very inconvenient to draw pictures with the HPLOT statement. I dislike the origin (point 0,0) being placed at the top left-hand corner of the TV screen. I also do not like to use shape tables to draw complex pictures involving transformations. I like a Cartesian coordinate system (X-Y axis) and simple concepts such as moving and drawing with an imaginary pen. That is why I wrote the Apple Graphics Package (AGP).

I find it very inconvenient to draw pictures with the HPLOT statement.

Christopher Hansen, Rd #4 Box 163, Troy, NY 12180.

AGP is a set of subroutines, written in Applesoft Basic, that, when combined with a "main" or "caller" program, allows the programmer to draw complex pictures with simple GOSUB statements. I will explain all of this later and provide several demonstration programs. AGP is easy to use, but some care is necessary when programming with it. And, last, but probably most important, AGP is fun to use.

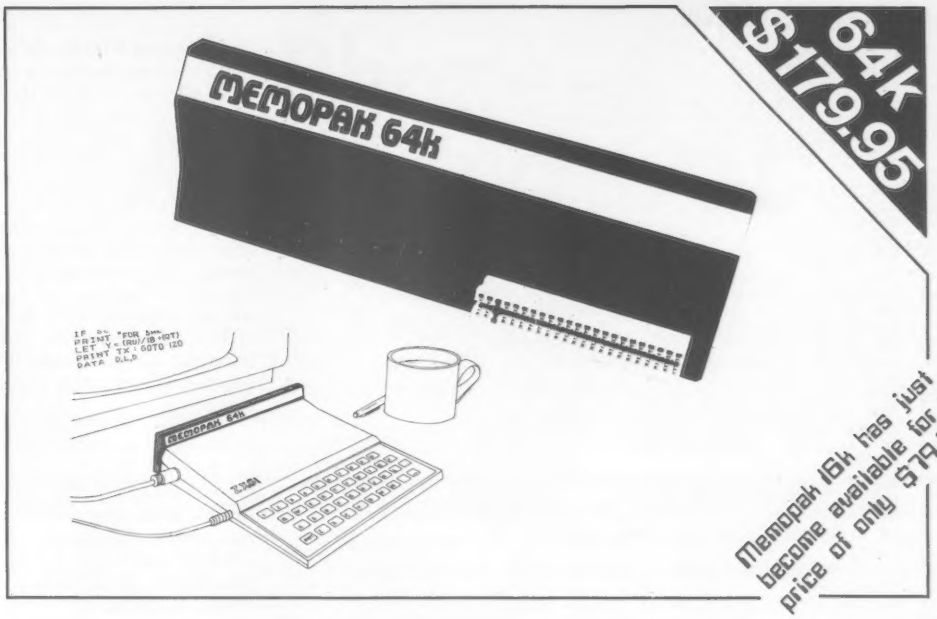
Loading the Package

In order to use AGP the first thing to do is type it in to your Apple (see Listing 1) and save it on disk or tape. This is your permanent copy of AGP, so be sure to correct any typing errors in this copy.

To use the package with your programs first load AGP into memory from disk or tape. After AGP has been loaded, type in your program. Be sure, however, that you do not type NEW before entering your program or AGP will be cleared from memory. Also be sure that your programs do not use line numbers from 10000 to 10980 because AGP uses these.

Listing 1.

```
10000  REM  APPLE GRAPHICS PACKAGE
10010  REM  REVISION 2.8 -- 05/01/81
10020  REM
10025  REM  CHRISTOPHER HANSEN
10027  REM  AVERILL PARK HIGH SCHOOL
10028  REM  AVERILL PARK, NEW YORK.
10029  REM
10030  REM  RESET SUBROUTINE
10040  X=FRE(0)
10045  XT=0 : YT=0
10050  X=0 : Y=0 : X1=0 : X2=0 : X3=0 : Y1=0 : Y2=0
10060  Y3=0 : XB=0 : XC=0 : YB=0 : YC=0 : XS=1 : YS=1
10070  XO=0 : YO=0 : DG=0 : RD=0 : SN=0 : CS=0
10080  XE=0 : XF=0 : WT=7.95 : WB=-WT: WR=10
10090  WL=-WR : VT=WT : VB=WB : VR=WR : VL=WL
10100  UA=1 : UB=0 : UC=1 : UD=0
10110  C$="" : C1$="" : C2$= "" : UT$="" : RETURN
10120  REM
10130  REM  MOVE SUBROUTINE
10140  X1=X : Y1=Y : RETURN
10150  REM
10160  REM  DRAW SUBROUTINE
10170  X2=X : Y2=Y : XH=X : XI=Y
10175  X1=X1+XT : Y1=Y1+YT : X2=X2+XT : Y2=Y2+YT
10180  IF XS<>1  OR  YS<>1  THEN GOSUB 10290
10190  IF DG<>0 THEN GOSUB 10320
```



Can you improve excellence?

We can. By adding our Memotech Memopak to the excellence of the ZX81 we have achieved perfection.

The growth of interest in computer use caused by the introduction of the Sinclair ZX81 has made new and exciting demands on the ingenuity of electronic engineers. At Memotech we have focused our attention on the design of inexpensive, reliable memory extensions.

The Memopak is a 64K RAM pack which extends the memory of the ZX81 by a further 56K. The new memory extensions are designed to be within the price range expected by Sinclair users. It plugs directly into the back of the ZX81 and does not inhibit the use of the printer or other add-on boards. There is no need for an additional power supply or leads.

Increase your memory.
The Memopak together with the ZX81 gives a full 64K, which is neither switched nor paged, and is directly addressable. The unit is user transparent and accepts such basic commands as 10 DIM A(9000).

0-8K . . . Sinclair ZX81 ROM
8-16K . . . This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programs, and can be used to run assembly language routines.
16-32K . . . This area can be used for basic programs and assembly language routines.
32-64K . . . 32K of RAM memory for basic variables and large arrays.

With the Memopak extension the ZX81 is transformed into a powerful computer, suitable for business, leisure and educational use, at a fraction of the cost of comparable systems.

Free service on your Memopak.
Within the first 90 days, should anything go wrong with your Memopak return it to us and we will fix or replace it free of charge.

Try Memopak with no obligation.
You can use our Memopak in your home without obligation. After 10 days, if you are not completely satisfied, simply return it for a full refund.

MEMOTECH

Memotech Corp.
7550 W. Yale Ave.
Suite 220
Denver Co. 80227
Ph. (303) 986-0016

Mail to: Memotech Corp. 7550 W. Yale Ave. Suite 220 Denver, Colo. 80227

I understand that if I'm not completely satisfied, I can return my Memopak in 10 days for a full refund.

	Price †	Qty.	Amount
Memopak 64k RAM	$ 179.95		
Memopak 16k RAM	$ 79.95		
Shipping and Handling	$ 4.95	———	$ 4.95
		Total	

☐ Check
☐ Visa ☐ MC
Exp. _____
Act. No. _____
Signature _____
Name _____
Street _____
City _____ State _____ Zip _____

† U.S. Dollars

CC07

CIRCLE 176 ON READER SERVICE CARD

Graphics Package, continued...

```
10200  GOSUB 10420
10210  GOSUB 10630
10220  IF CN THEN 10260
10230  XB=(X1+10)*13.95 : XC=(X2+10)*13.95
10240  YB=191-((Y1+7.95)*12) : YC=191-((Y2+7.95)*12)
10250  HPLOT XB,YB TO XC,YC
10260  X1=XH : Y1=XI : RETURN
10270  REM
10280  REM SCALING
10290  X1=X1*XS : X2=X2*XS : Y1=Y1*YS : Y2=Y2*YS
10300  RETURN
10310  REM
10320  REM ROTATE
10330  X1=X1-XO : X2=X2-XO : Y1=Y1-YO : Y2=Y2-YO
10340  RD=(DG*3.1415926)/180 : SN=SIN(RD) : CS=COS(RD)
10350  XE=(X1*CS)+(Y1*SN) : XF=(-X1*SN)+(Y1*CS)
10360  X1=XE+XO : Y1=XF+YO
10370  XE=(X2*CS)+(Y2*SN) : XF=(-X2*SN)+(Y2*CS)
10380  X2=XE+XO : Y2=XF+YO : RETURN
10390  REM
10400  REM
10410  REM WINDOW
10420  X1=UA*X1+UB : Y1=UC*Y1+UD
10430  X2=UA*X2+UB : Y2=UC*Y2+UD
10440  RETURN
10450  REM
10500  REM CODE SUBROUTINE
10510  C1$=""
10520  IF X1<VL THEN C1$="L" : GOTO 10530
10525  C1$="X"
10530  IF X1>VR THEN C1$=C1$+"R" : GOTO 10540
10535  C1$=C1$+"X"
10540  IF Y1<VB THEN C1$=C1$+"B" : GOTO 10550
10545  C1$=C1$+"X"
10550  IF Y1>VT THEN C1$=C1$+"T" : RETURN
10560  C1$=C1$+"X" : RETURN
10565  C2$=""
10570  IF X2<VL THEN C2$="L" : GOTO 10580
10575  C2$="X"
10580  IF X2>VR THEN C2$=C2$+"R" : GOTO 10590
10585  C2$=C2$+"X"
10590  IF Y2<VB THEN C2$=C2$+"B" : GOTO 10600
10595  C2$=C2$+"X"
10600  IF Y2>VT THEN C2$=C2$+"T" : RETURN
10610  C2$=C2$+"X" : RETURN
10620  REM CLIP SUBROUTINE
10630  GOSUB 10510 : GOSUB 10565
10640  IF C1$="XXXX" THEN IF C2$="XXXX" THEN CN=0 : RETURN
10650  UT$=LEFT$(C1$,1) : IF UT$=LEFT$(C2$,1) AND UT$<>"X"
       THEN CN=1 : RETURN
10652  UT$=MID$(C1$,2,1) : IF UT$=MID$(C2$,2,1) AND UT$<>"X"
       THEN CN=1 : RETURN
10654  UT$=MID$(C1$,3,1) : IF UT$=MID$(C2$,3,1) AND UT$<>"X"
       THEN CN=1 : RETURN
10656  UT$=RIGHT$(C1$,1) : IF UT$=RIGHT$(C2$,1) AND UT$<>"X"
       THEN CN=1 : RETURN
10660  C$=C1$ : IF C$="XXXX" THEN C$=C2$
10670  IF LEFT$(C,1)="X" THEN 10700
10680  Y3=Y1+(Y2-Y1)*(VL-X1)/(X2-X1) : X3=VL
10690  GOTO 10780
10700  IF MID$(C$,2,1)="X" THEN 10730
10710  Y3=Y1+(Y2-Y1)*(VR-X1)/(X2-X1) : X3=VR
10720  GOTO 10780
10730  IF MID$(C$,3,1)="X" THEN 10760
10740  X3=X1+(X2-X1)*(VB-Y1)/(Y2-Y1) : Y3=VB
10750  GOTO 10780
10760  IF RIGHT$(C$,1)="X" THEN 10780
10770  X3=X1+(X2-X1)*(VT-Y1)/(Y2-Y1) : Y3=VT
10780  IF C$=C1$ THEN 10810
10790  X2=X3 : Y2=Y3 : GOSUB 10565
10800  GOTO 10640
10810  X1=X3 : Y1=Y3 : GOSUB 10510
10820  GOTO 10640
10830  REM
10840  REM
10850  REM SET WINDOWING/CLIPPING
10860  UA=(VR-VL)/(WR-WL) : UB=VL-WL*UA
10870  UC=(VT-VB)/(WT-WB) : UD=VB-WB*UC
10880  RETURN
10890  REM
10900  REM RELATIVE MOVE
10910  X1=X1+X : Y1=Y1+X : RETURN
10920  REM
10930  REM RELATIVE DRAW
10940  X=X+X1 : Y=Y+Y1
10950  GOSUB 10170
10960  RETURN
10970  REM ####################################
10980  REM END OF AGP
```

Programming With the Package

The first statement in a program using AGP must be: GOSUB 10040. This subroutine call resets and initializes AGP; it is called the RESET subroutine. If you forget to place this statement in your program, AGP will not work properly.

The next statement should usually be HGR2. This statement tells the Apple to enter page two of hi-res graphics, which, in turn, means that the entire screen will be used for graphics and that the Apple will use high-resolution or fine line graphics. HGR2 is the only "enter-graphics" statement that should be used with AGP. The others will work either incorrectly or not at all.

After the HGR2 statement I would recommend an HCOLOR statement to set the color of the lines to be drawn. My favorite color to use is white (number 3) because white gives you the highest resolution possible (finest lines). But any other color will work well, too. (Be sure not to pick black, however, unless you are drawing over another color.)

Basic Drawing Subroutines

The Basic Drawing Subroutines are the routines used to draw lines in AGP. Each one is invoked by the main program assigning a value to the variables X and Y and then calling the specific subroutine with a GOSUB statement. X and Y correspond to the ordered pair (x,y) where x is the position on the horizontal or x-axis and y is the position on the vertical or y-axis. The center of the screen (the origin) is the ordered pair (0,0). The left side of the screen has an x value of -10, while the right side has an x value of 10. Likewise, the bottom of the screen has a y value of -7.95, while the top has a y value of 7.95.

Drawing is done with an imaginary pen which can be moved to the desired position by a Move subroutine and can draw lines from its current position with a Draw subroutine. Connecting lines can be drawn by a series of calls to the Draw subroutine.

Here are the first two line drawing subroutine calls:

MOVE: 30 X=a : Y=b : GOSUB 10140

where a and b are the x and y coordinates, respectively, of the point to which the pen is to be moved. Line number 30 is a dummy line number, of course, but the GOSUB number for Move must always be 10140.

DRAW: 30 X=a : Y=b : GOSUB 10170

where a and b are the x and y coordinates, respectively, of the point to which you wish to draw and 30 is a dummy line number as before.

With both of these subroutine calls, as with all AGP calls, the format can be changed (i.e., the X and Y specification

Phone— And Find Out.

Find out why there's a rush to **Strictly Soft Ware.** Why our customers find us one-of-a-kind.

You'll find the right service. Attention to your interests, answers to your questions, reports on new developments, suggestions for your needs.

You'll find the right prices. Our specials raise eyebrows. Our everyday prices bring smiles.

And you'll find the right selection. No turkeys. No tricks. No limits to what you want, when you want it.

So phone and find out. Call now (toll-free) for our free catalog.

SPECIALS • MORE THAN JUST GAMES • SPECIALS

• Arcade Machine $36.99	• Master Type $26.99	• Star Blazer $23.99
• Wizardry II $24.99	• Screen Writer II $99.99	• Inter. Grand Prix $19.99
• Ribbit $19.99	• Home Accountant $55.99	• Jellyfish $19.99
• Time Zone $69.99	• Home Money Minder .. $25.99	• Deadline $39.99
• Swashbuckler $22.99	• Desk Top Plan II $184.99	• Falcons $19.99

IBM Deadline .....$42.99 • Word Processor .....$99.99 • Space Guardian .....$22.99 **IBM**

Arcade Games

ABM
Apple-oids
Apple Panic
Arcade Machine
Autobahn
Beer Run
Bug Attack
Compucube
Computer Air Combat
Computer Baseball
County Fair
Crossfire
Cyber Strike
Dark Forest
Dogfight
Epoch
Falcons
Firebird
Flight Stimulator
Galactic Attack
Gamma Goblins
Genetic Drift
Golden Mountain
Gorgon
Hadron
Hi Res Soccer
Intl Gran Prix
Juggler
Minotaur
Missle Defense
Mouskattack
Outpost
Pool 1.5
Pegasus II
Phantoms Five
Pulsar II
Reversal
Ribbit
Robot War
Ruski Duck
Snack Attack
Snake Byte
Sneakers
Super Invaders
Star Blazer
Star Thief
Space Eggs
Space Quarks
Swashbuckler
Thief
Threshhold
Track Attack
Trick Shot
Warp Attack
Warp Destroyer

Adventures

Adventures 1-12
Alkemstone
Akalabeth
Apventure to Atlantis
Castle Wolfenstein
Crush, Crumble, Chomp
Cyborg
Galactic Empire
Lords of Karma
Creature Venture
Mystery House
Napoleon's Campaigns
Oldorf's Revenge
Oo Topos
The Prisoner
Race for Midnight
Southern Command
Space Adventure
Swordthrust
Talawa's Last Redoubt
Stone of Sisyphus
Tarturian
Temple of Apshai
The Terrorist
Time Zone
Ulysses/Golden Fleece
Ultima
Wizard/Princess
Wizardry
Zork I
Zork II

Business

Accounting
Continental
Peachtree
Broderbund
The Apple Speller
ASCII Express
Creative Financing
Data Capture
Data Factory
DB Master
DB Master Utility
Desk Top Plan II
Easywriter
Eduware
Financial Partner
Graphtrix
Letter Perfect
Magic Spell
Magic Window
The Mail Room
The Merger
Menu Generator
Micro Courier
PFS
PFS Report
Real Estate Analyzer
Spellstar
Super Text II
TASC Compiler
Tax Manager
Tax Preparer
Versaform
Visiblend
Visicalc 3.3
Visidex
Visifactory
Visifile
Visischedule
Visiterm
Visitrend/Visiplot
Wordstar

Home/Personal

Decision Master
The Correspondent
Home Accountant
Home Money Minder
Master Type
Financial Management System II

Above titles are partial selection. Call for prices and catalog.

MasterCard VISA

We take Master Card or VISA (include card # and expiration date). Ohio residents add 5.5% tax. Include $2.00 for postage. 3% discount if check accompanies order.

Send for free catalog. Prices subject to change. Hrs.: 9-9 weekdays; 9-6 Sat.; 12-5 Sun.

Strictly Soft Ware
Post Office Box 338
Granville, Ohio 43023
order by phone **800-848-5253**
in Ohio **614-587-2938**

Apple is a registered trademark of Apple Computer, Inc.
IBM is a registered trademark of International Business Machines Corporation.

CIRCLE 246 ON READER SERVICE CARD

statements put on separate lines), but this is the format I like to use.

It is necessary at this point to explain exactly what the variables X and Y are and why they are used in AGP calls. X and Y are "system variables." They are to be used in AGP calls and should not be used anywhere else in a program loaded with AGP. At the end of this article there is a list of all the system variables used by AGP. Some of them are used in AGP calls, but most are used internally (i.e., to do calculations). Altering these values in a program will cause AGP to work improperly.

Getting back to the drawing subroutines: there are two more subroutines that are used to draw lines. They are Relative Move and Relative Draw. These routines work the same way as Move and Draw, except that instead of moving or drawing to an absolute point, they move or draw a relative distance from the current imaginary pen position. This distance is specified by a displacement in the x and y directions. Here they are:

RELATIVE MOVE: 30 X=a : Y=b : GOSUB 10910

RELATIVE DRAW: 30 X=a : Y=b : GOSUB 10940

where a and b are the amount of displacement in the x and y directions, respectively, to move or draw.

Listing 2 is a demonstration program using the Basic Drawing Subroutines. Test this program on your Apple. You will see that it draws the x-y axis on the TV screen.

You may now be thinking to yourself, "What happens if I try to draw a line off the side of the screen?" No, you won't get the message ILLEGAL QUANTITY ERROR. Instead, the line will be chopped off where it intersects the side of the screen. This is one of the most powerful features of AGP, so don't be afraid to use it.

Table 1.

AGP System Variables

C$	C1$	C2$	CN	CS	DG	RD	SN	UA
UB	UC	UD	UT$	VB	VL	VR	VT	WB
WL	WR	WT	X	X1	X2	X3	XB	XC
XE	XF	XH	XI	XO	XS	XT	Y1	Y2
Y3	YB	YC	YE	YF	YO	YS	YT	

Listing 2.

```
10  REM  DEMO
20  GOSUB 10040 : REM RESET
30  HGR2 : HCOLOR=3 : REM ENTER GRAPHICS AND SET COLOR
40  X=-10 : Y=0 : GOSUB 10140 : REM  MOVE
50  X=10 : Y=0 : GOSUB 10170 : REM  DRAW
60  X=-10 : Y=-10 : GOSUB 10910 : REM  RELATIVE MOVE
70  X=0 :Y=20 : GOSUB 10940 : REM  RELATIVE DRAW
80  END
```

Listing 3.

```
1   REM DEMO ROTATE AND SCALE SQUARES
5   HCOLOR=3
10   GOSUB 10040
20   HGR2
30   FOR Z=0 TO 200 STEP 5
40   DG=Z
45   XS=Z/70+.05 : YS=XS
50   X=4 : Y=4 : GOSUB 10140
51   X=4 : Y=-4 : GOSUB 10170
52   X=-4 : Y=-4 : GOSUB 10170
53   X=-4 : Y=4 : GOSUB 10170
54   X=4 : Y=4 : GOSUB 10170
70   NEXT Z
80   END
```

Advanced Graphics With AGP

AGP not only allows you to draw lines, it also allows you to transform them. This is done with built-in advanced graphics features. Advanced graphics includes translating, scaling, rotation, windowing, and clipping lines drawn with the Basic Drawing Subroutines.

Translating

Translating causes the origin (0,0) to be placed on any point specified. Therefore, if you decided to place the origin on the point (0,2), all lines drawn would be shifted to the right two units. Lines will still be clipped on the edges of the screen when the origin is moved. The origin can even be moved off screen. The syntax of the translating statement is:

30 XT=a : YT=b

where a is the x coordinate and b is the y coordinate of the origin and 30 is a dummy line number.

After setting the translation point, as with all other AGP transformations, all lines drawn will be transformed.

Scaling

Scaling causes the lines that are drawn to be scaled in both the x and y directions and specified. For example, if you set the x scaling to 2 and the y scaling to 0.5, the lines drawn would be twice as long as normal in the x direction and half as long as normal in the y direction. The syntax of the scaling statement is:

30 XS=x : YS=y

where x is the scaling in the x direction and y is the scaling in the y direction and 30 is a dummy line number.

Rotation

Rotation is performed in AGP by specifying the amount of rotation in degrees. The syntax of the rotate statement is:

30 DG=theta

where theta is the amount of rotation in degrees and 30 is a dummy line number. Rotation is around the origin, and positive degrees rotate clockwise and negative degrees rotate counter-clockwise.

In order to rotate around a point other than the origin, the point must be specified. This is done with this command:

30 XO=a : YO=b

where (a,b) is the point around which lines are to be rotated.

APPLE • ALTOS • ATARI • MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • ADDS

HP • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • GTE • DIABLO • BMC • CENTRONIC • NEC • HAZELTINE • MEMOREX • AMPEX • PERSONAL SOFTWARE • ADDS • XEROX • DIABLO

MICRO

BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif

SPECIAL OF THE MONTH

HEWLETT PACKARD

HP 41CV
OUR PRICE
MSL 325.00 $239.00 Save 86.00

EXPANSION BOARD
Q STAR
16K RAM BOARD
MSL 199.00
OUR PRICE $99.00 Save 100.00

MICRO-SCI

APPLE II+ COMPATIBLE DRIVE

W/ CONTROLLER		W/O CONTROLLER	
MSL	OUR PRICE	MSL	OUR PRICE
549.00	429.00	449.00	379.00
Save 216.00	COMPARE TO APPLE DRIVE	Save 146.00	COMPARE TO APPLE DRIVE

APPLE IS A REG. TRADE MARK OF APPLE COMPUTER

IBM PERSONAL COMPUTER INCLUDES:

2 Drives
Colour Graphic Board
64K Memory

CALL FOR PRICE

*Subject to availability

FRANKLIN 64K

ACE 100

APPLE COMPATIBLE

INTRODUCTORY OFFER

MSL 1595.00 Call for Price

Save 560.00

The Franklin ACE* 100 is a professional personal computer that is hardware and software compatible with the Apple II+ and includes many features not found on the Apple unit. All programs written for the Apple II will run on the Franklin ACE 100 without modification including those using high and low resolution black and white graphics. The ACE 100 is plug compatible with Apple. All peripherals designed for the Apple II will operate with the ACE 100 without modification.

The Franklin ACE 100 is a personal computer with the power, quality and reliability to meet the most demanding applications of the business professional. It comes complete with 64K of RAM memory which fulfills the demanding memory requirements of VisiCalc and CP/M based programs. The system includes a full upper and lower case keyboard with true shift capability and a numeric pad. The computer generates a full character set to the video screen that displays upper and lower case characters.

The 72 key keyboard includes an alpha lock key which simplifies operation with existing Apple software. The numeric pad cluster includes special keys such as period, plus, minus, greater than (go to) and asterisk (multiply) that are used frequently with VisiCalc.

The Franklin ACE 100 includes a joystick/ game paddle connector, a speaker and eight peripheral connectors. A built-in fan and a 50 watt power supply permit all eight peripheral connectors to be used without power or overheating problems.

Franklin ACE 100 Features

- Apple II compatible
- 64K of RAM memory
- Upper and lower case
- Typewriter-style keyboard
- Twelve key numeric pad
- Alpha lock shift key
- VisiCalc friendly
- 50 watt power supply
- Built-in fan

COMPARE OUR COMPUTER

FRANKLIN ACE 100 compared to APPLE II

FEATURES	APPLE II	FRANKLIN ACE 100
Computer with 48K RAM Memory	$1530.00	STD
Microsoft 16K RAM Card (16K RAM Memory)	195.00 (option)	STD
ABT 10 Key Pad	125.00 (option)	STD
Videx Keyboard Enhancer	149.00 (option)	STD
R.H. Electronics Super Fan II (Muffin Fan)	69.00 (option)	STD
TOTAL	$2068.00	$1595.00

APPLE IS A REG. TRADE MARK OF APPLE COMPUTER

LE MONITOR

METAL CABINET

SANYO TYPE

9" GRN. PHS. MONITOR
12" GRN. PHS. MONITOR

MSL 189.00 OUR PRICE $119.00 Save 70.00

APPLE II PLUS 48K

*Subject to availability

CALL FOR PRICE

APPLE IS A REG. TRADEMARK OF APPLE COMPUTER

HEWLETT PACKARD

HP 85

The professional's choice: Hewlett-Packard's HP-85

MSL 2750.00 OUR PRICE $1975.00 Save 775.00

HEWLETT PACKARD

HP 125

OUR PRICE $1975.00
MSL 2750.00 Save 775.00

DUAL MASTER DRIVE
MSL 2500.00 OUR PRICE 1595.00 Save 905.00

XEROX 820

WORD PROCESSING SYSTEM (INCLUDES SOFTWARE)

MSL 3495.00 OUR PRICE $2649.00 Save 846.00

NEC STUDENT SYSTEM 64K

*NEC PC 8001
*NEC PC 8012
*NEC PC 8031
12" Grn. Phs. Video Monitor

MSL 2839.00 OUR PRICE $2095.00 Save 744.00

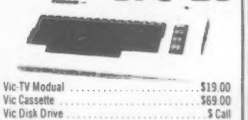
HEWLETT PACKARD

HP-87

MSL 2495.00 OUR PRICE $1749.00 Save 746.00

commodore

VIC-20



Vic-TV Modual	$19.00
Vic Cassette	$69.00
Vic Disk Drive	$ Call
Vic 6 Pack program	$44.00

MSL 299.00 OUR PRICE $255.00 Save 44.00

EPSON

	MSL	OUR PRICE	Save
MX 80	645.00	429.00	216.00
MX 80FT	745.00	535.00	210.00
MX 100	995.00	719.00	276.00

commodore

STUDENT SYSTEM

4032 - 32K 40 COL CRT
4940 - DUAL DISK DRIVE

MSL 2590.00 OUR PRICE $1978.00 Save 612.00

WE RESERVE THE RIGHT TO CORRECT TYPOGRAPHICAL ERRORS. THIS AD SUPERCEDES ALL PREVIOUS ADS.

RADIO SHACK 48K TRS 80 W/2 DRIVE MOD III

MSL 2495.00 OUR PRICE $1799.00 Save 696.00

1 Year Extended WARRANTY

$99.00

INQUIRE

SAVINGS
SERVICE
SELECTION
SATISFACTION

MICRO MAIL ORDER
BUSINESS WORLD WAREHOUSE
18720 Oxnard, #108
Tarzana, CA 91356
OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Telex: 182852
Answer: MICKO TZNA

Name (Please print) _____
Address _____
City _____ State _____ Zip _____

Qty	Make	Model	Description	Price	Total

*California residents add 6% sales tax
**Add 3% Shipping & Handling — Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

TOTAL ORDER $ _____
TAX IF APPLICABLE* _____
SHIPPING & HANDLING** _____
TOTAL ENCLOSED $ _____

Certified Check or M.O. | Allow 2 weeks clearance for personal check
Bank Wire Transfer

VISA MasterCard

CREDIT CARD # _____
Exp. Date _____ Signature _____

MAXELL • DYSAN • EPSON • CCS • SHARP • CASIO • HP • VERBATIM • MEMOREX • SOROC • CORVUS • PERSONAL SOFTWARE • CCS

BMC • CENTRONIC • NEC • HAZELTINE • AMPEX • VERBATIM • HITACHI • HAYDEN • CANON • NOVATION • D.C. HAYS MICROCOMPUTERS • PAPER TIGER • PERSONAL SOFTWARE • GTE •

CIRCLE 178 ON READER SERVICE CARD

Windowing and Clipping

Windowing and clipping transformations are the two most complex parts of AGP. Together they allow you to set up a "world coordinate system." The world coordinate system can be thought of as the x-y axis coordinate system of an infinite plane or two-dimensional world.

When the RESET subroutine is called from a program it automatically sets the TV screen to show from -10 to 10 on the x-axis and -7.95 to 7.95 on the y-axis. This is only a default, however, AGP allows you to show any part of the world that you want. In this way the TV screen is analogous to a window. This is why it is called the window transformation. The syntax of the AGP window subroutine call is:

```
30 WL=a : WR=b : WB=c : WT=d
40 GOSUB 10860
```

where a is the x value of the left side of the screen, b is the x value of the right side of the screen, and c and d are the y values of the bottom and top of the screen, respectively.

All lines drawn with the Basic Drawing Subroutines are in the world coordinates, so this transformation affects all moves, draws, relative moves, and relative draws. And, as before, all lines drawn outside the window are clipped.

Adjusting the Viewport

The viewport is the part of the screen that displays what the window contains. When RESET is called, the viewport is set to be the entire screen. But, as with other AGP defaults, this may be modified.

When defining the viewport, Screen Coordinates are used. On the TV screen, the screen coordinates range from -10 to 10 on the x axis and from -7.95 to 7.95 on the y-axis (the same as the default world coordinates). Unlike world coordinates, whose positions may be changed (by adjusting the window), screen coordinates always have the same positions on the TV screen. To specify the viewport use the command:

```
30 VL=a : VR=b : VB=c : VT=d
40 GOSUB 10860
```

where a, b, c, d, are the left, right, top and bottom, respectively, of the viewport in screen coordinates.

Here are a few hints for the Window and Viewport settings:

Remember that the window is specified using world coordinates and that the viewport is specified using screen coordinates.

Do not set the viewport so that it extends over the sides of the TV screen (i.e., VL must be greater than or equal to -10; VR must be less than or equal to 10; VB must be greater than or equal to -7.95 and VT must be less than or equal to 7.95). If you don't follow this rule, AGP will become confused and cause an error if you try to draw a line off screen.

Keep the window rectangle and the viewport rectangle in geometric proportion or the lines drawn by AGP will be distorted.

Listing 4.

```
5  REM DEMO PROGRAM #2
10  TEXT : HOME : GOSUB 10140
20  PRINT "ENTER COLOR (WHITE,RED,GREEN,BLUE)"
30  INPUT A$
40  IF A$="WHITE" THEN H=3
50  IF A$="RED" THEN H=5
60  IF A$="GREEN" THEN H=1
70  IF A$="BLUE" THEN H=2
80  HCOLOR=H
90  PRINT : PRINT
95  PRINT "ENTER D FOR DEFAULTS" : GET D$
96  IF D$="D" THEN 250
97  PRINT : PRINT
100  PRINT "ENTER WINDOW DIMENSIONS (WORLD COORDINATES)"
110  INPUT WL,WR,WB,WT
120  PRINT : PRINT
130  PRINT "ENTER VIEWPORT DIMENSIONS (SCREEN COORDINATES)"
140  INPUT VL,VR,VB,VT
150  GOSUB 10860
160  PRINT : PRINT
170  PRINT "ENTER AMOUNT OF SCALING (X,Y)"
180  INPUT XS,YS
190  PRINT : PRINT
200  PRINT "ENTER DEGREES OF ROTATION"
210  INPUT DG
220  PRINT : PRINT
230  PRINT "ENTER POINT OF ROTATION"
240  INPUT XO,YO
250  HOME : SPEED=20
260  PRINT "----- DRAWING BEGINS"
270  SPEED=255
280  HGR2 : X=0 : Y=0 : GOSUB 10140
290  FOR Z=.5 TO 3 STEP .3
300  AX=Z
310  AY=SQR((AX*AX*AX)+2)
320  X=AX : Y=AY : GOSUB 10170
330  X=-AX : Y=AY : GOSUB 10170
340  X=AX : Y=-AY : GOSUB 10170
350  X=-AX : Y=-AY : GOSUB 10170
360  NEXT
370  X=0 : Y=0 : GOSUB 10170
380  FOR J=1 TO 2500 : NEXT J
390  HGR2 : TEXT : HOME
400  END
```

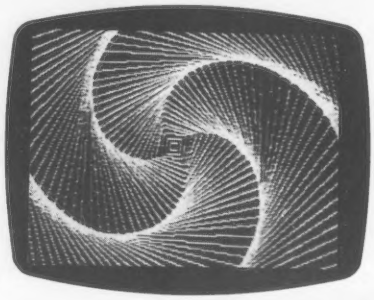


Figure 1. This photograph shows what AGP will draw with the program Listing 3. Notice the clipping at the screen edges.

Demo Programs

To give an idea of the power and ease of use of AGP, I have written two demo programs. The first one (see Figure 1 and Listing 3) demonstrates rotation, scaling, and clipping. The program itself, however, is very simple.

First the program resets AGP and then enters hi-res graphics and sets the color to white. Then the FOR/NEXT loop sets a different amount of rotation and scaling and draws a square for each repetition.

Try this program on your Apple. It is fascinating to watch each line being drawn and to see the vertices of the squares connect to form curved lines. Also you will notice that the connecting vertices are clipped where they move off the screen but then come around and appear in a different position.

PEEK & POKE SOFTWARE

APPLE, ATARI, TRS-80, IBM

	List	Our Price
APPLE (disk)		
*David's Midnight Magic (Brod.)	34.95	25.95
Wizardry (Sir Tech)	49.95	41.95
Frogger (O-L)	34.95	29.00
Superscribe II (O-L)	129.95	107.85
DB Master (Stoneware)	229.00	190.00
ATARI (disk or cassette)		
*Temple of Apshai (Aut. Sim.)	39.95	29.55
Crossfire (O L)	29.95	24.85
Pool 1.5 (Innov. Des.) (disk)	34.95	29.00
TRS-80 (Model I or III) (disk or cass.)		
*Star Warrior (Aut. Sim.)	39.95	29.55
Galactic Empire (Brod) (cass.)	14.95	12.40
Sargon II (Hayden) (disk)	34.95	29.00
IBM		
*Temple of Apshai (Aut. Sim.)	39.95	29.55
Home Accountant Plus (Continental)	150.00	124.50
*Joysticks (TG)	64.95	48.95
Visicalc (Visicorp)	250.00	207.50

Many More! FREE PRICE LIST

Cert. Ck., M.O., Visa, M.C., (Incl. card # and exp. date), pers. ck. (add 2 wks). Shipping add $2.00. C.O.D. add $1.50. Wyo. res. add 4%. Prices subject to change.

PEEK & POKE SOFTWARE
711 RANGER DRIVE
CHEYENNE, WY 82009
PHONE (307) 635-1849

Apple, Atari, TRS-80, IBM and Visicalc are Registered Trademarks.

CIRCLE 210 ON READER SERVICE CARD

CASH AND CARRY.

NEW!
The Perfect Lightweight Personal Computer Carry Case
$99.95
Includes shipping & handling
(NC Residents Add 4% Sales Tax)

Model 2360-2

- Solid Foam Interior Allows for Custom Fit.
- Double Wall Polyethlene Protection.
- Locking Latches.
- Perfect for VIC 20,® TRS 80® Color Computer, Atari® 800, Atari® 400 Terminals and Accessories.
- Interior Dimensions 20⅝" x 15⅝" x 5".

TravelMaster™

MasterCard **We Accept VISA & MasterCard Orders.** VISA
Outside NC call toll-free 1-800-334-0551
Distributor/Dealer inquiries invited

Manufactured by: TravelMaster Division
Southern Case, Inc. □ P.O. Box 28147 □ Raleigh, NC 27611 □ 919-821-0877

CIRCLE 242 ON READER SERVICE CARD

LOGO
© M.I.T.

Krell's LOGO for APPLE II*
Includes: our new low price and

1. Two copies of Krell's LOGO for Apple II*
2. A UTILITY disk containing M.I.T.'s extremely valuable demonstration material, a series of pre-defined shapes which may be substituted for the LOGO TURTLE, and Krell's timesaving library of pre-defined procedures.
3. ALICE IN LOGOLAND, a twenty program tutorial series for intermediate and experienced programmers new to the LOGO language.
4. The technical manual LOGO for Apple II* by H. Abelson & L. Klotz. This is the official technical manual issued by M.I.T.
5. LOGO FOR THE APPLE II* by Harold Abelson, Byte Books. A complete instructional manual for intermediate and advanced users of LOGO.
6. THE ALICE IN LOGOLAND PRIMER, a step by step, lavishly illustrated introduction to LOGO for those who are new to both programming and to LOGO. (available in May and sent free to all purchasers of Krell's LOGO for Apple II*)
7. A comprehensive wall chart that portrays, explains and graphically illustrates the LOGO commands in action.
8. A one-year's free subscription to the LOGO & EDUCATIONAL COMPUTING NEWSLETTER. (Regularly $30.00 per year). A new authoritative source of information about the structure, classroom application and capabilities of LOGO, plus an up to the minute forum on the most significant new ideas and issues in educational computing.

$149.95

College Board SAT* Prep Series

TRS-80, APPLE, PET, ATARI, CP/M, PDP-11 Based on past exams, presents material on the same level of difficulty and in the same form used in the S.A.T.

S.A.T., P.S.A.T., N.M.S.Q.T. — Educator Edition set includes 25 programs covering Vocabulary, Word Relationships, Reading comprehension, Sentence Completion, and Mathematics. $229.95
INDEPENDENT TESTS OF S.A.T. SERIES PERFORMANCE SHOW A MEAN TOTAL INCREASE OF 70 POINTS IN STUDENTS' SCORES

GRADUATE RECORD EXAM Series — Educator Edition includes 28 programs covering Vocabulary, Word Relationships, Reading Comprehension, Sentence Completion, Mathematics, Analytical Reasoning and Logical Diagrams. $289.95

Micro-Deutsch

MICRO-DEUTSCH set includes 24 grammar lessons, covering all materials of an introductory German course. Four test units also included. Grammar lessons use substitution transformation drills, item ordering, translations and verb drills. Drill vocabulary based on frequency lists. Suitable for use with any high school or college textbook. Extensively field tested at SUNY, Stony Brook. APPLE*, PET*. $179.95

Isaac Newton + F.G. Newton

Perhaps the most fascinating and valuable educational game ever devised - ISAAC NEWTON challenges the players to assemble evidence and discern the underlying "Laws of Nature" that have produced this evidence. Players propose experiments to determine if new data conform to the "Laws of Nature". FULL GRAPHICS NEWTON - presents all data in graphic form. This game is suitable for children. Players may select difficulty levels challenging to the most skilled adults. Both Games $49.95

MasterCard **Krell Software Corp.** VISA

"The State of the Art in Educational Computing"
1320 STONY BROOK ROAD / STONY BROOK NY 11790 / (516) 751-5139

Krell Software Corp. has no official ties with the College Entrance Examination Board or the Educational Testing Service. Krell is, however, a supplier of products to the E.T.S. N.Y.S. residents add sales tax.
PROGRAMS AVAILABLE FOR THE TRS80, APPLE II, PET & ATARI.
*Trademarks of Apple Comp Corp., Tandy Corp., Commodore Corp., Atari Corp.

CIRCLE 171 ON READER SERVICE CARD

Prob-lem

The world is full of intriguing problems that never got into a textbook.

Problems for Computer Solution
by Steve Rogowski

Ninety intriguing and fascinating problems, each thoroughly discussed and referenced, make an excellent source of exercises in research and preliminary investigation. Eleven types of problems are provided in the following areas: arithmetic, algebra, geometry, trigonometry, number theory, probability, statistics, calculus and science. Author Stephen Rogowski of SUNY-Albany has included several problems which have never been solved. He feels that some research and an attempt to solve these will sharpen students' insight and awareness.

Some of the problems are not new like the one asking how much the $24 the Indians were paid for Manhattan would be worth today had it been deposited in a bank. However, this problem was revised to have a variable interest rate so it would be a challenge to program. Of course, many of the problems are new and have never been in print before.

The student edition has 106 pages and includes all 90 problems (with variations), 7 appendices and a complete bibliography. Cost is $4.95.

The 182-page teacher edition contains solutions to the problems, each with a complete listing in Basic, sample runs, and in-depth analyses explaining the algorithms and theory involved. Cost is $9.95.

To order send payment* plus $2.00 postage and handling to Creative Computing, Dept. C723, 39 E. Hanover Avenue, Morris Plains, N.J. 07950. Orders may also be charged to your Visa, Mastercard or American Express account—by mail include credit card name, number and expiration date, or if you prefer, use our 24-hour toll-free number, 800-631-8112. In N.J. only 201-540-0445.
*N.J. Residents add 5% tax.

creative computing

YOU CAN PAY MORE BUT YOU CAN'T GET MORE!

Model III 16K
$839
Model III 48K
2 disc & RS232C
$2059

Color Computer 4K
$310
w/16K Ext. Basic
$459
w/32K Ext. Basic
$525

BUY DIRECT. These are just a few of our great offers which include Printers, Modems, Computers, Peripherals, Disc Drives, Software and more. call TOLL FREE 1-800-343-8124

We have the lowest possible fully warranteed prices and a full complement of Radio Shack Software.

computer plus
Write for your free catalog.
245A Great Road
Littleton, MA 01460
617 • 486 • 3193

MasterCard VISA

CIRCLE 129 ON READER SERVICE CARD

Maxell Floppy Disks

The Mini-Disks with maximum quality.

Dealer inquiries invited. C.O.D's accepted. Call FREE (800) 235-4137.

PACIFIC EXCHANGES
100 Foothill Blvd., San Luis San Luis Obispo, CA 93401.
In Cal. call (800) 592-5935 or (805)543-1037.

CIRCLE 204 ON READER SERVICE CARD

ATARI®

Entertainer Kit	88.00	Atari 800 16K	735.00
Programmer Kit	56.00	Atari 400 16K	359.00
Communicator Kit	345.00	Atari 410 Cassette	80.00
Microsoft Basic	72.00	Atari 810 Disk	480.00

ALL ATARI SOFTWARE 20% OFF
Plus Loads of 3rd Party Software!
VOTRAX TYPE'N'TALK: 340.00
ALSO **EPSON & CENTRONICS PRINTERS**
ZENITH & TELEVIDEO TERMINALS

BBI Mail Order is a company made up of computer professionals. We are able to provide low prices as well as technical support. Give us a call and find out why we consider the Atari the best home computer on the market today. You won't be disapointed.

BBI Mail Order
Specializing in Atari Home Computers
P.O. Box 365
Newton Highlands, MA 02161
(617) 964-3080

CIRCLE 113 ON READER SERVICE CARD

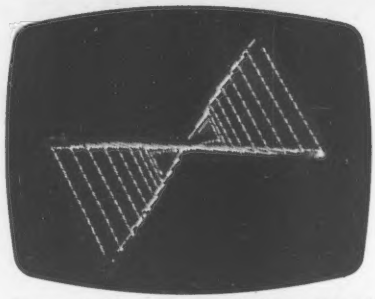


Figure 2. This photograph shows one of the many combinations of rotation, scaling and windowing possible with the program in Listing 4.

The second program (Figure 2, Listing 4) is interactive (the computer asks for input). It lets you enter the color you want, and then asks whether you want default values for the different transformations. If a D is input the program draws the picture normally. If any other key is pressed the program asks you to input the world and screen coordinates and other goodies. The photo shows one of the many pictures possible with this program.

AGP has many applications, including pictures, maps and games.

Conclusion

AGP has many applications, including: pictures, maps and games. It also is a great tool for demonstrating the Apple and for learning about computer graphics.

If you have an interesting program using AGP, please send it to me. The only programs I have seen using AGP are my own, so I would enjoy hearing from other interested programmers. □

"What happened to Saint Peter?"

Please call (213) 706-0333.

Modem order line: (213)883-8976

Our Epson prices are so low, we're not allowed to print them.

EPSON MX-80.....$CALL
80 cps/9x9 matrix/Lower case with true descenders/Bi-directional & Logic seeking/Adjustable tractor/Expanded printing/Block graphics/Forms control/Compressed printing/Double-strike printing/Correspondence quality/Emphasized printing mode/Standard parallel interface.

EPSON MX-80 F/T.....$CALL
Same features as the MX-80 plus Friction Feed. Adjustable removable tractor is standard for ease of handling forms and single sheets.

FOR A LIMITED TIME

FREE GRAFTRAX-80

WITH ALL MX-80 PURCHASES

EPSON MX-100.....$CALL
Most of the same features as the MX-80 & MX-80 F/T but on 15½ inch carriage for printing 132 columns with standard 10 cpi font or 236 columns in the compressed character font. The MX-100 is complete with Dot Resolution Graphics.

EPSON INTERFACES & OPTIONS

TRS-80 MODEL I, III CABLE	30.00
TRS-80 MODEL I Keyboard Interface	95.00
TRS-80 MODEL II CABLE	30.00
APPLE INTERFACE & CABLE	100.00
IEEE 488 INTERFACE	60.00
SERIAL INTERFACE MOD 8141	70.00
ATARI CABLE	35.00
BUFFERED SERIAL INTERFACE 8K X-On/X-Off, Hardware Handshake	159.00
MICROBUFFER II 16K Apple	259.00
SERIAL CABLE Male to Male	30.00
DOT RESOLUTION GRAPHICS	90.00
MX-80 REPLACEMENT RIBBON	13.00
MX-100 REPLACEMENT RIBBON	24.50
MX-80 PRINT HEAD	40.00
MX-100 PRINT HEAD	45.00
EPSON SERVICE MANUAL	40.00
IBM PC CABLE	37.95
PARALLEL INTERFACE 16K Buffer	159.00
MICROBUFFER II 32K Apple	299.00

We guarantee everything for 30 days. If anything is wrong, return the item and we'll make it right. And we'll pay the shipping charges.

We accept Visa and Master Card on all orders: COD orders, up to $300.00.

Add $2.00 for standard UPS shipping and handling on orders under 50 lbs. delivered in continental U.S. Call for shipping charges over 50 lbs. Foreign, FPO and APO orders, add 15% for shipping. Californians add 6% sales tax.

Prices quoted are for stock on hand and are subject to change without notice.

Alpha Byte COMPUTER PRODUCTS

31245 LA BAYA DRIVE, WESTLAKE VILLAGE, CA 91362

CIRCLE 105 ON READER SERVICE CARD

Cyrillic Anyone?

Jeffrey Mangasarian

Most Apples speak English, which is fine for most applications. But what if you or your prospective user speaks and reads Russian, Chinese, Hebrew, Greek or Japanese?

Character Editor is a program, written in Pascal, to change the character set displayed by the Apple, thereby enabling it to communicate in any language you choose—even mathematics.

Every APPLE1: disk comes with a file called SYSTEM.CHARSET. This file contains a printable character for every character on the keyboard including control and lower case letters. You may wonder why lower case letters cannot be displayed on the screen if they are actually present in the character set. The reason is that the Apple does not use the character set file when printing to a text screen. It has a built-in ROM-like character generator from which it prints characters. The character set on your APPLE1: disk can only be displayed on a hi-res screen.

Now the problem arises: How can hi-res screens be used to display text? There are two ways in which this can be done. The first is to modify the BIOS (the Pascal Basic Input Subsystem which resides in the file SYSTEM.APPLE) so that it directs text to a hi-res page. This is complex and requires a knowledge of machine language. It has been done by Charlie Kellner, who developed the public-domain hi-res1 disk which displays both upper and lower case.

Jeffrey T. Mangasarian, 6021 Old Middleton Rd., Madison, WI 53705.

The second way to use a hi-res screen to display text is to use the Turtlegraphics unit found in the SYSTEM.LIBRARY. It is this simpler method which I will use with the character editor (CHARED).

CHARED can edit up to 128 characters (0-127) at a time. Each character, an 8 x 8 matrix of Boolean, is really 8 bits tall and 7 bits wide. The last column is not printed in order to allow 40 characters to fit on a line. (There are 280 dots across the screen.

How can hi-res screens be used to display text?

Hence, 7 dots per character times 40 letters equals 280 dots. In short, 8 x 7 fits, and 8 x 8 doesn't.)

It is a good idea to experiment with the editor before sitting down to create a complete character set. Two difficulties which you may encounter are: characters placed in a location inaccessible from the Apple keyboard, and printing the new character set.

There are 128 ASCII characters. These characters are numbered sequentially from 0 to 127. So there are 128 locations in memory that can be edited. Some of these locations, however, are inaccessible from the keyboard and therefore can be used only with difficulty. The Apple-accessible ASCII characters are as follows: 0-91, 93, 94, and 96-122.

In fact, all these "inaccessible" characters can be used in a Pascal program using the Pascal CHR(X) function. Control characters (ASCII 0-31) are rather awkward to use and can't be typed into the text while using the SYSTEM.EDITOR. So there are some limitations, but both upper and lower case can be used.

The second difficulty is that characters must be displayed on a hi-res page by using the unit Turtlegraphics. There are two main methods for displaying text on the hi-res screen: WCHAR and WSTRING. Both are used in the programs below. There is also a command, CHARTYPE (MODE), for determining how the characters are to be drawn on the screen. For example, one could have all the characters drawn in inverse by using CHARTYPE (11).

CHARTYPE(6) allows one to write text over a graphics image; then later when you write the same text over the same

Scotch Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.

(800)235-4137

PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo CA
93401 In Cal call
(800)592-5935 or
(805)543-1037

Dealer Inquiries Invited

CIRCLE 204 ON READER SERVICE CARD

Dysan CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted.

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. (In Cal. call
(805) 543-1037)

CIRCLE 204 ON READER SERVICE CARD

FREE CATALOG
FOR ATARI 400/800 COMPUTERS
From Computer's Voice

2370 Ella Dr.
Flint, MI 48504
(313) 238-5585

Return the coupon below or a facsimile and receive your **free** catalog of software and hardware for the ATARI 400/800 computers.

Check all that apply:

I own an ____ATARI 800 ____ATARI 400 with ____K.
I also have ____ATARI 410 recorder ____ATARI 810 Disk Drive ____40 column ____80 column printer

I am interested in the following kinds of software:
____Educational ____Games ____Business ____Home

NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

Return this coupon to:

Computer's Voice
2370 Ella Dr.
Flint, MI 48504
(313) 238-5585

Don't Make An Ash Of Yourself

You are the Firebug, and you're at the top of a flammable, five-story maze. The exit is on Floor #1 and each of the hallways in between is increasingly more challenging.

Worse: Your fuse is burning—fast.

Look! Some careless person has left cans of gasoline sitting around. Wouldn't it be fun to set the maze on fire as you go through? After all, you are the Firebug...

You've made a wrong turn! This isn't an exit, it's a dead end! And behind you the maze is burning...

Firebug from Muse... it sizzles.

For Apple II™ or Apple II Plus™ with 48K. $24.95 at your local computer store. Write or call Muse for information and the dealer nearest you.

347 North Charles Street
Baltimore, Maryland 21202 301-659-7212

CIRCLE 194 ON READER SERVICE CARD

Happy Hands

Offers Discounts on All

TRS-80™ COMPUTERS

We Have What You Are Looking For

- ☐ PROMPT SHIPPING
- ☐ AVAILABLE SERVICE CONTRACTS
- ☐ DISCOUNTED PRICES COMPARABLE TO ANY OTHERS
- ☐ NO TAX ON OUT OF STATE SHIPMENTS

Call Collect For Prices
And Shipping Schedules

505-257-7865

or write

HAPPY HANDS
P.O. DRAWER I
RUIDOSO, NEW MEXICO
88345

CIRCLE 161 ON READER SERVICE CARD

COTTAGE SOFTWARE

PACKER: Machine language program that edits all or part of your Basic program to run faster, save memory, or ease editing. The 5 options include UNPACK—unpacks multiple statement lines into single statements maintaining logic inserts spaces and renumbers lines. SHORT—deletes unnecessary words, spaces, and REM statements. PACK—packs lines into maximum multiple statement lines, maintaining program logic. RENUM—renumbers lines, including all branches. MOVE—moves line or blocks of lines to any new location in program. On 2 cassettes for 16K, 32K, & 48K. For TRS-80™ Mod I or III Level II or Disk Basic.....$29.95

SYSTEM TAPE DUPLICATOR: Copy your SYSTEM format tapes. Includes verify routines. The Model III version allows use of both 500 and 1500 baud cassette speeds.
For TRS-80™ Model I or III Level II.....$15.95

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Model I or III Level II & Printer .$17.95

PRINT TO LPRINT TO PRINT: Edits your Basic program in seconds to change all Prints to LPrints (except Print@ or Print#) or LPrints to Prints. Save edited version.
For TRS-80™ Model I or III Level II.....$12.95

FAST SORTING ROUTINES: For use with Radio Shack's Accounts Receivable, Inventory Control I, and Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable.....$19.95
FAST SORT for Inventory Control I.....$19.95
FAST SORT for Disk Mailing List (specify data diskette cassette for 1 drive system).....$14.95
ALL THREE ROUTINES.....$44.95

Prices subject to change without notice. Call or write for complete catalog. Dealer inquiries invited. VISA and MasterCard accepted. Foreign orders in US currency only. Kansas residents add 3% sales tax. On-line catalog on Wichita FORUM-80: 316-682-2113 Or call our 24 hour phone 316-683-4811 or write:

COTTAGE SOFTWARE
614 N. Harding Wichita, KS 67208

TRS-80 is a trademark of Tandy Corporation

CIRCLE 143 ON READER SERVICE CARD

location, the text will be erased, leaving the picture intact. This method is used in the programs below for moving the cursor around on the screen without changing the hi-res screen.

The CHARED program does not actually modify the SYSTEM.CHARSET, but creates a different file called CHARS.DATA. Once this new file is saved on disk, you can replace your SYSTEM.CHARSET with it. The following steps are recommended when first using this program to install a new character set:

- Enter the filer by typing "F."
- Change the SYSTEM.CHARSET to OLD.CHARSET by using the C)hange option.
- Change the name of CHARS.DATA to SYSTEM.CHARSET, again using the C)hange option.

Once the program has copied SYSTEM.CHARSET to CHARS.DATA, or has reset an already existing CHARS.DATA, the following commands are possible:

Pen Status Commands

F: This command fills the pen with "ink" so that a mark of this color ink is plotted wherever you move the Apple cursor on the grid.

E: This option empties your pen so that you can move the cursor around without leaving a mark. It is like lifting the pen from the paper.

B: This command sets the "ink" color to black.

W: This command sets the "ink" to white.

Cursor Pen Movement Commands

U: This moves the cursor up one space.

D: This moves the cursor down one space.

L: This moves the cursor to the left one space.

R: This moves the cursor to the right one space.

Character Utilities Commands

G: This command loads in a character from the ASCII table of characters found on page 283 of the Operating System Reference manual. When you type "G," you will be prompted by a message that says "TYPE IN CHAR NUMBER." At this point type the ASCII number of the character that you wish to edit (e.g. to edit the character "*" type 42, or to edit the digit "7" type the number 55).

C: This command copies one character in the ASCII list to another location in the ASCII list. When you type "C," you are prompted by "FROM TO." To transfer the data you must type the source ASCII number, followed by a space, not a comma, then type the destination ASCII number (e.g., to move the contents in letter "A" TO "O," you type "65 48").

Q: This exits the CHARED program and writes the newly-edited character set to the file CHARS.DATA.

Graphics Editor

The graphics editor (GEDIT) was created to demonstrate the display of made-up character sets on a hi-res page using Turtlegraphics. It is intended that this program be modified to suit your needs. GEDIT will function just as the Pascal editor does, except that only the exchange command and cursor movements are possible. Table 1 lists the commands. □

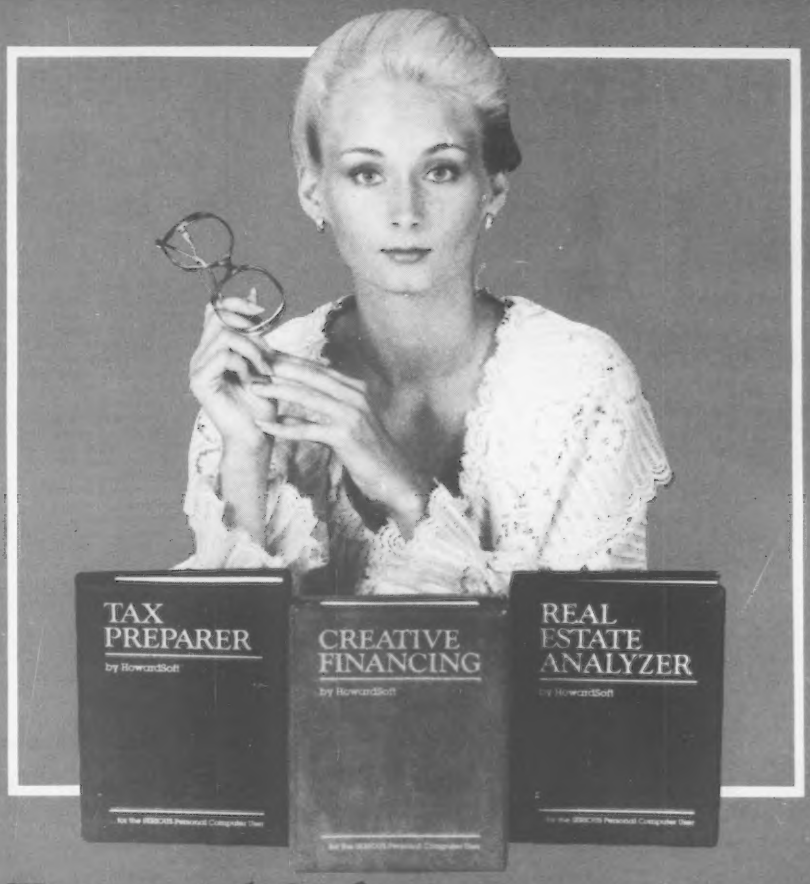
H	Exchanges text horizontally until a control c is typed*
V	Exchanges text vertically until a control c is typed*
*	Moves cursor right*
←	Moves cursor left*
ctrl 0	Moves cursor up*
ctrl L	Moves cursor down*
ctrl I	Tabs over five spaces*
esc	Exits the program*
space bar	Spaces over one space
return	Go to next line

*Does not work while in the exchange mode.

Table 1. Graphics Editor Commands.

Keyboard Positions.

These are the standard keyboard positions (upper and lower-case) for the following: Greek, German, French, Spanish, English, and Hebrew.



Financial Software Is Our Only Business And We Take It Seriously!

TAX PREPARER by HowardSoft:
A professional package for year-long record-keeping and year-end tax filing; prepares federal returns for 10 schedules and 11 forms, including income averaging, min and max taxes, depreciation and capital gains, and much more; easy to operate because of self-prompting instructions, automatic posting among forms, and powerful itemizing features; prints in IRS format for direct filing, including printing on preprinted Form 1040; annually updated at a fraction of original cost.

CREATIVE FINANCING by HowardSoft:
A flexible package for evaluating real-life loans & investments; provides cash flow & R-O-I projections as well as payment tables and objective decisions; can be used to determine yield to maturity of discounted bonds, present value of annuities stream, buy vs. lease decisions, APR of loans including wraparounds and analyses of all new loan types.

REAL ESTATE ANALYZER by HowardSoft:
A tool for objectively comparing alternative investments and projecting future results; professional in both analyses of cash flow & R-O-I and client-oriented report printouts; allows what-if studies for changes in property values, loans, rents, taxes, operating expenses and the value of money; perfect for cash and profit projections on new or old rental property.

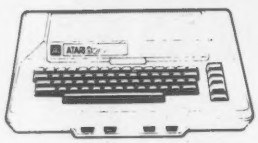
ALL 3 ARE UP-TO-DATE WITH THE LATEST TAX LAWS, INCLUDING ACRS DEPRECIATION AS CREATED BY THE 1981 ECONOMIC RECOVERY ACT

HSS Howard Software Services
for the SERIOUS Personal Computer User

8008 Girard Ave., Suite 310 | La Jolla, CA 92037 | (714) 454-5079

CIRCLE 163 ON READER SERVICE CARD

ATARI HOME COMPUTERS



ATARI

ATARI 800
16K . . . $679
32K . . . $749
48K . . . $819

ATARI 400
16K . . . $329
32K . . . $478
48K . . . $555

410 Recorder	$76.00
810 Disc Drive	$449.00
822 Printer	$269.00
825 Printer	$629.00
830 Modem	$159.00
820 Printer	$269.00
850 Interface	$169.00
New DOS 2 System	$29.00
CX30 Paddle	$18.00
CX40 Joy Stick	$18.00
CX853 16K RAM	$89.00
Microtek 16K RAM	$69.00
Microtek 32K RAM	$139.00
Ramdisk (128K)	$449.00
Inteck 48K Board	$249.00
One year extended warranty	$70.00
481 Entertainer	$83.00
482 Educator	$130.00
483 Programmer	$57.00
484 Communicator	$344.00

ATARI HOME COMPUTER PROGRAMS

HOME OFFICE	
CX404 ATARI Word Processor	$119.00
CX8102 Calculator	$29.00
CX412 Dow Jones Investment Evaluator	$99.00
CX4109 Graph It, Joystick optional	$17.00
CX4104 Mailing List	$20.00
CX4115 Mortgage & Loan Analysis	$13.00
CX4103 Statistics 1	$20.00
CX8107 Stock Analysis	$20.00
CXL4015 TeleLink 1	$23.00
HOME STUDY	
CX4101 An Invitation to Programming 1	$20.00
CX4106 An Invitation to Programming 2	$23.00
CX4117 An Invitation to Programming 3	$23.00
CX4107 Biorhythm	$13.00
Conversational Languages (ea.)	$46.00
CX4121 Energy Czar	$13.00
CX4114 European Countries & Capitals	$13.00
CX4108 Hangman, Joystick optional	$13.00
CX4102 Kingdom	$13.00
CXL4007 Music Composer	$47.00
CX4123 Scram, uses joystick	$20.00
CX4112 States & Capitals	$13.00
CX4110 Touch Typing	$20.00
HOME ENTERTAINMENT	
PAC MAN	$35.00
CENTIPEDE	$35.00
CAVERNS OF MARS	$32.00
CXL4013 Asteroids	$35.00
CXL4004 Basketball	$27.00
CX4105 Blackjack	$13.00
CXL4009 Computer Chess	$33.00
CXL4012 Missile Command	$35.00
CXL4008 Space Invaders	$35.00
CXL4011 Star Raiders	$42.00
CXL4006 Super Breakout	$33.00
CXL4010 3-D Tic-Tac-Toe	$27.00
CXL4005 Video Easel	$24.00
PROGRAMMING LANGUAGES AND AIDS	
CXL4003 Assembler Editor	$47.00
CXL4002 ATARI BASIC	$47.00
CX8126 ATARI Microsoft BASIC	$70.00
CXL4018 PILOT	$72.00
CX405 PILOT (Educational)	$105.00

ATARI PROGRAM EXCHANGE:

Eastern Front '41	$25.50
Avalanche	$15.50
Outlaw	$15.50
747 Landing Simulation	$15.50
Babel	$15.50
Dog Daze	$15.50
Downhill	$15.50
Attack!	$15.50
Blackjack-Casino	$15.50
Reversi II	$15.50
Domination	$15.50
Solitare	$15.50
Disk Fixer	$15.50
Supersort	$15.50
Data Management	$15.50
Chameleon	$15.50
Instedit	$15.50
Insomnia	$15.50
My First Alphabet	$25.50
Mapware	$18.00
Number Blast	$11.50
Family Cash Flow	$15.50
Weekly Planner	$15.50
Bowler's Data Base	$13.00
Banner Generator	$11.50
Crystal Software	
Bermuda Fantasy	$26.00
Beneath Pyramids	$20.00
Galactic Quest	$26.00
House of Usher	$20.00
Forgotten Island	$26.00
Haunted Palace	$33.00
Compumax (Acct. Rec., Gen. Ledger, Inventory, Payroll, ea.)	$110.00
Synapse	
File Manager 800	$69.95
Dodge Racer	$19.00
Chicken	$24.00
Slime	$24.00
Nautilus	$24.00
Disk Manager	$24.00
Fort Apocalypse	$24.00
Assembler	$39.00
Protector	$24.00
EXPY	
Ricochet	$14.50
Crush Crumble & Chomp	$24.00
Star Warrior	$29.00
Rescue at Rigel	$24.00
Datestones	$16.00
Invasion Orion	$18.50
Mission Asteroid	$22.00
OnLine	
Jaw Breaker	$27.00
MouskATTACK	$31.00
The Next Step	$34.00
Softporn	$77.00
Wizzard & Princess	$29.00
Arcade Plus	
Ghost Hunter (cassette)	$24.00
Ghost Hunter (disk)	$30.00
K-Byte	
K-BYTE Krazy Shoot Out (ROM)	$39.00
K-DOS	$69.00
Visicalc	$179.00
Letterperfect (Word Processor)	$109.00
Data Soft Textwizzard	$89.00

Texas Instruments

TI-99/4A $299

PHA2100 R F Modulator	$29.00
PHP 1600 Telephone Coupler	$179.00
PHP 1700 RS-232 Accessories Interface	$179.00
PHP 1800 Disk Drive Controller	$239.00
PHP 1850 Disk Memory Drive	$389.00
PHP 2200 Memory Expansion &32K RAM)	$319.00
PHP 1100 Wired Remote Controllers (Pair)	$31.00
32K Expansion	$329.00
PHP Printer Solid State	$319.00
PHM 3006 Home Financial Decisions	$26.00
PHM 3013 Personal Record Keeping	$43.00
PHD 5001 Mailing List	$60.00
PHD 5021 Checkbook Manager	$18.00
PHM 3008 Video Chess	$60.00
PHM 3010 Physical Fitness	$26.00
PHM 3009 Football	$26.00
PHM 3018 Video Games I	$26.00
PHM 3024 Indoor Soccer	$26.00
PHM 3025 Mind Challengers	$22.00
PHM 3031 The Attack	$35.00
PHM 3032 Blasto	$22.00
PHM 3033 Blackjack and Poker	$22.00
PHM 3034 Hustle	$22.00
PHM 3036 Zero Zap	$18.00
PHM 3037 Hangman	$18.00
PHM 3038 Connect Four	$18.00
PHM 3039 Yahtzee	$22.00
Tombstone City 21st Century	$34.00
Munch Man	$34.00
T I INVADERS	$34.00
CAR WARS	$34.00

Printers

Centronics 739-1	$519.00
Centronics 739-3	$619.00
Diablo 630 Special	$1799.00
Epson	
MX80 w/Graftrax	$449.00
MX80FT	Call
MX100	Call
NEC	
8023	$549.00
7730	Call
7720	Call
7710	Call
Okidata	
82A	$499.00
83A	$749.00
84	$1129.00
Citoh Starwriter	
F10-40 CPS	$1469.00
F10-55 CPS	Call
Prowriter	$479.00
Talley	
8024-7	$1399.00
8024-L	$1629.00
MPC Apple Parallel Board & Cable	$69.00
IDS	
Paper Tiger	$Call
Prism	$Call
2 Meter RS232-RS232	$29.95

Cables Available For Most Interfacing Purposes

Computer Covers

ATTRACTIVE DUST COVERS FOR YOUR COMPUTER AND DISK DRIVE.

Atari 400. . . . . $6.99
Atari 800. . . . . $6.99
Atari 810. . . . . $6.99
All Atari Covers are Beige.

Commodore VIC-20. $6.99
Commodore 8032. $14.99
Commodore 8050/4040 . . . . . $10.99
All Commodore covers are Royal Blue.

Most software for Atari 400/800 available on cassette or disk.

computer mail order west

CALL TOLL FREE **800-648-3311**

Franco
Habla
Espanol

IN NEVADA, CALL (702) 588-5654

P.O. BOX 6689, STATE LINE, NEVADA 89449

HEWLETT PACKARD

HP•85 $1899

80 Column Printer	$799.00
HP•125	$1999.00
HP•83	$1699.00
HP•85 16K Memory Module	$169.00
5¼" Dual Master Disc Drive	$1769.00
HP•87	$1769.00
Hard Disk w/Floppy	$4349.00
Hard Disk	$3440.00
"Sweet Lips" Plotter	$1149.00
HP•41CV Calculator	$239.00
41C	$189.00
11C	$104.00
12C	$114.00
34C	$114.00
38C	$114.00
HP•41 Printer	$340.00

HPIL CALCULATOR PERIPHERALS

IL Modual	$104.00
Digital Cassette	$449.00
Printer/Plotter	$419.00
Card Reader	$164.00
Optical Wand	$99.00

NEC

8001-A	$749.00
8031	$749.00
8012	$549.00
Accounts Receivable	$295.00
Word Processing	$395.00
General Accounting	$295.00
Inventory Control	$295.00
Job Cost	$295.00

Disks

Maxell	
MD I (box of 10)	$36.00
MD II (box of 10)	$46.00
MFD I (8")	$44.00
MFD II (8" Double Density)	$54.00
Syncom (box of 10)	$29.00

Commodore

BUSINESS MACHINES

SOFTWARE

Word Pro 5 Plus	$319.00
Word Pro 4 Plus	$299.00
Word Pro 3 Plus	$199.00
Commodore Tax Package	$589.00
Visicalc	$179.00
Medical Billing	$449.00
The Source	$89.00
OZZ Information System	$289.00
Dow Jones Portfolio	$129.00
Pascal	$239.00
Legal Time Accounting	$449.00
Word Craft 80	$289.00
Power	$79.00
Socket-2-Me	$20.00
Jinsam	$Call
MAGIS	$Call
CPA	$Call
Real Estate Package	$799.00
The Manager	$209.00
Softrom	$129.00
BPI Inventory Control	$319.00
BPI Job Costing	$319.00
BPI Payroll	$319.00
BPI General Ledger	$329.00
Creative I SAM	$79.00
Creative General Ledger	$229.00
Creative Accounts Receivable	$229.00
Creative Inventory	$229.00

CBM 8032 $1039

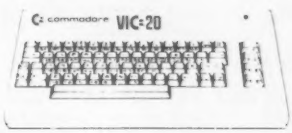
4032	$969.00
4016	$769.00
8096 Upgrade Kit	$399.00
Super Pet	$1599.00
2031	$529.00
8250 Doubled Sided Disk Drive	$1699.00
5 Megabyte Hard Disk	$2399.00
8050	$1299.00
4040	$969.00
8300 (Letter Quality)	$1799.00
8023	$769.00
4022	$599.00
Pet to IEEE Cable	$37.00
IEEE to IEEE Cable	$46.00
Tractor Feed for 8300	$240.00

VIC 20 $249

COMPLETE

CALL FOR AVAILABILITY AND PRICE FOR NEW VIC-64

16K VIC Expansion	$99.00
VIC 6 Pack Program	$44.00
VIC 1530 Commodore Datassette	$69.00
VIC 1540 Disk Drive	$499.00
VIC 1515 VIC Graphic Printer	$339.00
VIC 1210 3K Memory Expander	$32.00
VIC 110 8K Memory Expander	$53.00
VIC 1011 RS232C Terminal Interface	$43.00
VIC 1112 VIC IEEE-488 Interface	$86.00
VIC 1211 VIC 20 Super Expander	$53.00
VT 232 ViCTerm I Terminal Emulator	$9.00
VIC 1212 Programmers Aid Cartridge	$45.00
VIC 1213 VICMON Machine Language Monitor	$45.00
VIC 1901 VIC AVENGERS	$23.00
VIC 1904 SUPERSLOT	$23.00
VIC 1906 SUPER ALIEN	$23.00
VIC 1907 SUPER LANDER	$23.00
VIC 1908 DRAW POKER	$23.00
VIC 1909 MIDNIGHT DRIVE	$23.00



Terminal	$13.00
Un Word	$13.00
Grafix Menagerie	$11.00
VIC PICS	$15.00
Ticker Tape	$13.00
Banner Headliner	$13.00
RS 232	$39.00
VT 106A Recreation Pack A	$44.00
VT107A Home Calculation Pack A	$44.00
VT 164 Programmable Character/Gamegraphics	$12.00
Household Finance	$27.00
VIC Games	$19.00
VIC Home Inventory	$13.00
VIC Rec/Ed II	$13.00
VL101 Introduction to Computing	$19.00
VL 102 Introduction to BASIC Programming	$19.00
VM110 VIC 20 Programmers Reference Guide	$15.00

Apple

Call for availability and prices on all Apple computers and peripherals.

In-stock items shipped same day you call. No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the continental United States with no waiting period for certified checks or money orders. All prices shown are cash prices. Add 3% for Mastercard and Visa. NV and PA residents add sales tax. All items subject to availability and price change.

Televideo

910	$579.00
912C	$699.00
920C	$749.00
925C	$749.00
950	$939.00

Call for computers

802	$Call

Monitors

Amdex 12" B&W	$129.00
12" Green	$139.00
13" Color	$349.00
NEC	
12" B&W	$169.00
12" Color	$339.00
TI 10" Color	$349.00
Zenith ZVM 121 (Green)	$119.00

Modems

Livermore Star	$119.00
Hayes	
Smart	$239.00
Chronograph	$199.00
Novation Auto	$239.00
D Cat	$169.00
Cat	$159.00
Micromodem II	$279.00
Micromodem 100	$309.00

Nev. & Pa. residents add sales tax.

computer mail order east

CALL TOLL FREE **800-233-8950**

INTERNATIONAL CALLS AND IN PA. CALL (717) 327-9575

477 E. THIRD ST., WILLIAMSPORT, PA 17701

Patricio Habla Espanol

CIRCLE 128 ON READER SERVICE CARD

Cyrillic, continued...

```
(*$S+*)
(*************************************)
(*                                   *)
(*       CHARACTER EDITOR            *)
(*                                   *)
(*             BY                    *)
(*                                   *)
(*      JEFFREY MANGASARIAN          *)
(*                                   *)
(*                                   *)
(*************************************)
PROGRAM CHARACTER_EDITOR;
USES TURTLEGRAPHICS;

(*************************************)
(*                                   *)
(*   VAR TABLE                       *)
(*                                   *)
(*                                   *)
(*   SOURCE    : BEGINNING BIT OF A  *)
(*               CHARACTER IN THE    *)
(*               ARRAY BUFFER        *)
(*                                   *)
(*   ABS       : POINTER TO A BIT IN *)
(*               THE BUFFER WHERE THE*)
(*               CURSOR IS LOCATED   *)
(*                                   *)
(*   X1        : CURRENT X LOCATION  *)
(*               IN THE GRID         *)
(*                                   *)
(*   Y1        : CURRENT Y LOCATION  *)
(*               IN THE GRID         *)
(*                                   *)
(*   NOX       : USED IN TESTING FOR *)
(*               CURSOR MOVEMENT     *)
(*                                   *)
(*   NOY       : USED IN TESTING FOR *)
(*               CURSOR MOVEMENT     *)
(*                                   *)
(*   PEN_FULL  : TRUE FOR A FULL PEN *)
(*               FALSE MEANS EMPTY   *)
(*                                   *)
(*   COLOR     : TRUE IF INK IS WHITE*)
(*               FALSE IF INK BLACK  *)
(*                                   *)
(*   LEGALSET  : SET OF COMMAND      *)
(*               CHARACTERS          *)
(*                                   *)
(*   BUFFER    : ARRAY OF 8192       *)
(*               BOOLEAN I.E. 128    *)
(*               CHARACTERS OF AN    *)
(*               8 BY 8 MATRIX       *)
(*                                   *)
(*   CURSOR    : ARRAY OF BOOLEAN    *)
(*               FOR APPLE CURSOR    *)
(*               ON THE EDIT GRID    *)
(*                                   *)
(*************************************)
```

"Look at this, Peckham—now that's what I call a microcomputer!"

```
VAR  COLOR : BOOLEAN;
     CHARMODE,NOX,NOY,SOURCE,OLDX,OLDY,BLOCK,ABS,X1,Y1 : INTEGER;
     DISK,DISKDATA : FILE;
     BUFFER : PACKED ARRAY[1..8192] OF BOOLEAN;
     CURSOR : PACKED ARRAY[1..8,1..8] OF BOOLEAN;
     PEN_FULL,SUCCESSFUL :BOOLEAN;
     CH : CHAR;
     LEGALSET : SET OF  CHAR;

(*************************************)
(*                                   *)
(* THIS PROCEDURE CREATES A          *)
(* CURSOR FOR THE EDITING GRID       *)
(*                                   *)
(*************************************)


    PROCEDURE MAKE_CURSOR;

       PROCEDURE MAKE(J : INTEGER; LINE : STRING);

         VAR I : INTEGER;

         BEGIN
         FOR I := 1 TO 8 DO
            CURSOR[I,J] := (LINE[I]='*');
         END;

       BEGIN
       MAKE(1,'   ***   ');
       MAKE(2,' ******  ');
       MAKE(3,' ******  ');
       MAKE(4,'  **** * ');
       MAKE(5,' ****** *');
       MAKE(6,' ******  ');
       MAKE(7,'   ***   ');
       MAKE(8,'         ');
       END;


(*************************************)
(*                                   *)
(* DRAWGRID SETS UP THE EDITING GRID *)
(*                                   *)
(*************************************)

    PROCEDURE DRAWGRID;

        VAR I,VERT,HOZ : INTEGER;
        BEGIN
        INITTURTLE;
        GRAFMODE;
        PENCOLOR (NONE);
        TURNTO(270);
        FOR I := 0 TO 7 DO
             BEGIN
             VERT := 40+I*12;
             MOVETO (VERT,162);
             PENCOLOR(WHITE),
             MOVE (112);
             PENCOLOR(NONE);
             END;
        TURNTO(0);
        FOR I := 0 TO 8 DO
             BEGIN
             HOZ :=  50+I*14;
             MOVETO (40,HOZ);
             PENCOLOR (WHITE);
             MOVE (83);
             PENCOLOR (NONE);
             END;
        END;

(*************************************)
(*                                   *)
(*  DRAWOPTIONS WRITES ALL THE       *)
(*  COMMANDS ON THE HI-RES SCREEN    *)
(*  NEXT TO THE EDITING GRID         *)
(*                                   *)
(*************************************)
    PROCEDURE DRAWOPTIONS;

      BEGIN
      MOVETO (159,135);
      WSTRING ('E=PEN EMPTY');
      MOVETO (159,125);
      WSTRING ('F=PEN FULL');
      MOVETO (159,115);
```

CALL MICRO POST TOLL FREE!

The Most Popular Products . . .

Sirius Software

Lemmings	$21.00
Fly Wars	$21.00
Outpost	$21.00
Cyclod	$21.00
Bandits	$24.45

On-Line Software

Time Zone	$74.96
Jaw Breaker	$22.46
Cranston Manor	$26.21

Brøderbund Software

Arcade Machine	$33.70
Chop Lifter	$26.20
Serpentine	$26.20

. . . At The Most Popular Prices

And Similar Savings On Our Entire Inventory Of:

Sirius • On-Line Systems • Artsci • Muse • Daykin5 • Howard Software • Brøderbund • Stoneware • Visicorp • TG Products • Cavalier • And Others!

★ EXCLUSIVE ★ MICRO POST OFFERS

Sirius Software's Joyport

An input device that allows selection of 4 Apple-compatible paddles, or 2 Apple-compatible joysticks or 2 Atari-type joysticks without opening the Apple case. $63.00 includes a FREE Atari joystick and a FREE copy of Sirius' hot new game for one to four players — Computer Foosball. (Additional Atari joysticks are available for $8.40 each)

Disk Special

5.25" single side, single density soft sector disk in quantities of ten — $2.50 each.

★ ***All Items In Stock And Ready For Immediate Delivery!***

★ ***Compare Our Total Cost – No Hidden Extras At Micro Post!***

Apple is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc.

To Order Call 24 Hours A Day

Outside California: 800-227-1617 Ask For Ext. "637"
Inside California: 800-772-3545 Ask For Ext. "637"

For Information Call Direct: (415) 254-1360 9 am - 4 pm

63

ORDER/REQUEST FORM

MICRO POST

Name _____

Address _____

City _____ State _____ Zip _____

Phone (____) _____

Product	Qty	Cost
Sub Total		
CA Residents Add 6½% Tax		
Shipping/Handling		$2.00
TOTAL		

NOTE: Cashier's Check or Money Order will greatly expedite your order. Please add a $10.00 handling fee for foreign orders.

PAYMENT

☐ Personal Check
☐ Cashier's Check/Money Order
☐ Visa ☐ MasterCard

Card # _____

Exp. Date _____

Signature _____

☐ Add my name to your mailing list

MAIL TO: MICRO POST, P.O. BOX 1989, ORINDA, CA 94563

CIRCLE 187 ON READER SERVICE CARD

```
      WSTRING ('U=UP');
      MOVETO (159,105);
      WSTRING ('D=DOWN');
      MOVETO (159,95);
      WSTRING ('R=RIGHT');
      MOVETO (159,85);
      WSTRING ('L=LEFT');
      MOVETO (159,75);
      WSTRING ('Q=QUIT');
      MOVETO (159,65);
      WSTRING ('B=BLACK');
      MOVETO (159,55);
      WSTRING ('W=WHITE');
      MOVETO (159,45);
      WSTRING ('G=GETCHAR (X)');
      MOVETO (159,35);
      WSTRING ('C=COPY (FROM TO)');
      END;

(*************************************)
(*                                   *)
(* COPY MOVES WHOLE CHARACTERS FROM  *)
(* ONE ASCII LOCATION TO ANOTHER     *)
(* IN THE BOOLEAN ARRAY BUFFER       *)
(*                                   *)
(*************************************)

 PROCEDURE COPY;

   VAR S,D,I : INTEGER;

   BEGIN
   MOVETO(50,10);
   WSTRING('FROM, TO');
   (*$I-*)
   READLN (KEYBOARD,S,D);
   (*$I+*)
   S := S*64;
   D := D*64;
   FOR I := 1 TO 64 DO
      BUFFER[D+I] := BUFFER[S+I];
   MOVETO (50,10);
   WSTRING('           ');
   END;
(*************************************)
(*                                   *)
(* DRAWSQUARE DRAWS A BLOCK IN THE   *)
(* GRID WHERE THE CURSOR IS          *)
(* THIS BLOCK MAY BE BLACK OR WHITE  *)
(* DEPENDING ON THE PENCOLOR         *)
(*                                   *)
(*************************************)

 PROCEDURE DRAWSQUARE (X,Y,YSKIP : INTEGER);

          VAR MODE,X2,Y2 : INTEGER;
              OKSET : SET OF CHAR;
       BEGIN
       OKSET := ['U','u','D','d','L','l','R','r','B','b','W','w'];
       X2 := X+1;
       Y2 := Y+1;
       X:=41+X*12;
       Y:=51+Y*14;
       IF CH IN OKSET THEN
          BEGIN
          BUFFER[SOURCE-72+Y2*8+X2] := COLOR;
          IF ((X2<8) AND (X2>0)) AND ((Y2<9) AND (Y2>0)) THEN
              BEGIN
              CASE COLOR OF
                 TRUE : MODE := 15;
                 FALSE: MODE := 0;
                 END;
              DRAWBLOCK (BUFFER,7,0,YSKIP,10,12,X,Y,MODE);
              DRAWBLOCK (BUFFER,7,0,YSKIP,1,1,X2+17,Y2+40,MODE);
              DRAWBLOCK (BUFFER,7,0,YSKIP,1,1,X2+10,Y2+40,MODE);
              DRAWBLOCK (BUFFER,7,0,YSKIP,1,1,X2+10,Y2+48,MODE);
              END;
          END;
       END;

(*************************************)
(*                                   *)
(* THIS PROCEDURE MOVES THE CURSOR   *)
(* FROM WHERE IT WAS (OLDX,OLDY) TO  *)
(* A NEW POSITION (X,Y)              *)
(*                                   *)
(*************************************)
PROCEDURE MOVE_CURSOR(X,Y :INTEGER);

   BEGIN
   IF (OLDX<>X) AND (OLDY<>Y) THEN
        BEGIN
        DRAWBLOCK (CURSOR,2,0,0,8,8,OLDX,OLDY,6);
        X := 41+X*12;
        Y := 51+Y*14;
        OLDX :=X;
        OLDY :=Y;
        DRAWBLOCK(CURSOR,2,0,0,8,8,X,Y,6);
        END;
   END;
(*************************************)
(*                                   *)
(* FILLARRAY IS THE CORE OF THE PROG *)
(* IT IS WHERE ALL THE COMMANDS ARE  *)
(* INPUT                             *)
(*                                   *)
(*************************************)
PROCEDURE FILLARRAY;
          (*************************************)
          (*                                   *)
          (*      MOVES CURSOR UP              *)
          (*                                   *)
          (*************************************)
          PROCEDURE UP;

              BEGIN
              IF Y1<7 THEN
                  BEGIN
                  Y1:=Y1+1;
                  ABS := ABS+1;
                  END;
              END;
          (*************************************)
          (*                                   *)
          (*      MOVES CURSOR DOWN            *)
          (*                                   *)
          (*************************************)
          PROCEDURE DOWN;
              BEGIN
              IF Y1>0 THEN
                  BEGIN
                  ABS :=ABS-1;
                  Y1:=Y1-1;
                  END;
              END;
          (*************************************)
          (*                                   *)
          (*      MOVES CURSOR RIGHT           *)
          (*                                   *)
          (*************************************)
          PROCEDURE RIGHT;
              BEGIN
              IF X1<6 THEN
                 BEGIN
                 X1:=X1+1;
                 ABS := ABS+8;
                 END;
              END;
          (*************************************)
          (*                                   *)
          (*      MOVES CURSOR LEFT            *)
          (*                                   *)
          (*************************************)
          PROCEDURE LEFT;
              BEGIN
              IF X1>0 THEN
                  BEGIN
                  X1:=X1-1;
                  ABS := ABS-8;
                  END;
   END;

(*************************************)
(*                                   *)
(* GETCHAR PULLS IN A NEW CHARACTER  *)
(* TO EDIT FROM THE BUFFER ARRAY     *)
(* IT ALSO WRITES THE NEW CHAR ON    *)
(* THE GRID                          *)
(*                                   *)
(*************************************)
PROCEDURE GETCHAR (VAR CNUMBER : INTEGER);

   VAR MODE,I1,J1,I,J : INTEGER;

   BEGIN
   (*$I-*)
```

IF YOU'RE WAITING FOR THE PRICE OF WORD PROCESSORS TO FALL WITHIN REASON,

Everyone expected it would happen sooner or later...with WordPro PLUS™ it already has! Now all the marvelous benefits of expensive and advanced word processing systems are available on Commodore computers, America's largest selling computer line. WordPro PLUS, when combined with the new 80 column CBM 8032, creates a word processing system comparable to virtually any other top quality word processor available—but at savings of thousands of dollars!

New, low cost computer technology is now available at a fraction of what you would expect to pay. This technology allowed Commodore to introduce the new and revolutionary CBM 8032 Computer.

WordPro PLUS turns this new CBM 8032 Computer into a sophisticated, time saving word processing tool. With WordPro PLUS, documents are displayed on the computer's screen. Editing and last minute revisions are simple and easy. No more lengthy re-typing sessions. Letters and documents are easily re-called from memory storage for editing or printing with final drafts printed perfectly at over five hundred words per minute!

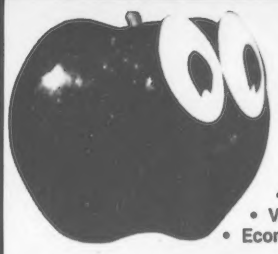
Our nationwide team of professional dealers will show you how your office will benefit by using WordPro PLUS. At a price far less than you realize.

Invest in your office's future...
Invest in WordPro PLUS...
Call us today for the name of the WordPro PLUS dealer nearest you.

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
(617) 444-5224
TELEX: 95 1579

CIRCLE 218 ON READER SERVICE CARD

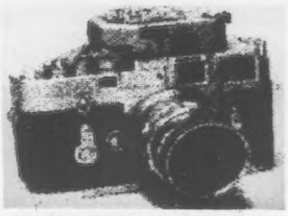
```
    REPEAT
      MOVETO (50,10);
      WSTRING('TYPE IN CHAR NUMBER');
      READLN (KEYBOARD,CNUMBER);
      SOURCE := (CNUMBER+1)*64;
      IF (CNUMBER<0) OR (CNUMBER>127) THEN
         WRITE (CHR(7));
      MOVETO (50,10);
      WSTRING('                    ');
    UNTIL (CNUMBER>-1) AND (CNUMBER<128);
    (*$I+*)
    CNUMBER := (CNUMBER+1)*64;
    FOR J := 8 DOWNTO 1 DO
       FOR I := 8 DOWNTO 1 DO
          BEGIN
          J1:=51+(J-1)*14;
          I1:=41+(I-1)*12;
          CASE BUFFER[CNUMBER] OF
             TRUE : MODE := 15;
             FALSE: MODE := 0;
             END;
          DRAWBLOCK (BUFFER,7,0,CNUMBER,10,12,I1,J1,MODE);
          DRAWBLOCK (BUFFER,7,0,CNUMBER,1,1,I+17,J+40,MODE);
          DRAWBLOCK (BUFFER,7,0,CNUMBER,1,1,I+10,J+40,MODE);
          DRAWBLOCK (BUFFER,7,0,CNUMBER,1,1,I+10,J+48,MODE);
          CNUMBER := CNUMBER-1;
          END;
    CNUMBER := 1;
    END;

(************************************)
(*                                  *)
(* THIS INITS DATA FOR GETTING A    *)
(* NEW CHAR                         *)
(*                                  *)
(************************************)
    PROCEDURE GET(VAR ABS:INTEGER);

        BEGIN
        OLDX := 41;
        OLDY := 51;
        ABS :=1;
        GETCHAR(ABS);
        X1 :=0;
        Y1 :=0;
        PEN_FULL := FALSE;
        DRAWBLOCK(CURSOR,2,0,0,8,8,OLDX,OLDY,6);
        END;

BEGIN (* FILLARRAY *)
COLOR := FALSE;
MOVETO(3,175);
WSTRING('CHARACTER EDITOR BY JEFFREY MANGASARIAN');
MOVETO(90,165);
WSTRING('     1980     ');
LEGALSET :=['e','E','f','F','w','W','b','B','u','U',
            'd','D','l','L','r','R','g','G'];
OLDX := 41;  (*SETUP STARTING X,Y FOR APPLE CURSOR*)
OLDY := 51;
DRAWBLOCK(CURSOR,2,0,0,8,8,OLDX,OLDY,6);
ABS :=1;
GET(ABS);
X1 :=0;
Y1 :=0;
REPEAT
  GRAFMODE;
  READ (CH);
  NOX := X1;
  NOY := Y1;
  CASE CH OF
     'e','E' : PEN_FULL := FALSE;
     'f','F' : PEN_FULL := TRUE;
     'w','W' : COLOR:=TRUE;
     'b','B' : COLOR:=FALSE;
     'u','U' : UP;
     'd','D' : DOWN;
     'l','L' : LEFT;
     'r','R' : RIGHT;
     'g','G' : GET(ABS);
     'c','C' : COPY;
    END;
  IF (CH IN LEGALSET) AND ((X1<>NOX) OR (Y1<>NOY)) THEN
     BEGIN
     IF (CH<>'Q') OR (CH<>'q') THEN
        IF PEN_FULL THEN
           DRAWSQUARE (X1,Y1,ABS);
     MOVE_CURSOR(X1,Y1);
     END;
  IF (CH='b') OR (CH='B') OR (CH ='W') OR (CH ='w') THEN
        BEGIN
        IF PEN_FULL THEN
           BEGIN
           IF (CH='B') OR (CH='b') THEN
             BEGIN
             COLOR := FALSE;
             CHARMODE := 0;
             END
           ELSE
             BEGIN
             COLOR := TRUE;
             CHARMODE := 15;
             END;
           ABS := SOURCE-72+(Y1+1)*8+X1+1;
           BUFFER[ABS] := COLOR;
           DRAWBLOCK(BUFFER,7,0,0,10,12,41+X1*12,51+Y1*14,CHARMODE);
           DRAWBLOCK(CURSOR,2,0,0,8,8,41+X1*12,51+Y1*14,6);
           DRAWBLOCK (BUFFER,7,0,ABS,1,1,X1+18,Y1+41,CHARMODE);
           DRAWBLOCK (BUFFER,7,0,ABS,1,1,X1+11,Y1+41,CHARMODE);
           DRAWBLOCK (BUFFER,7,0,ABS,1,1,X1+11,Y1+49,CHARMODE);
           END;
        END;
  UNTIL (CH = 'q') OR (CH='Q');
  END;

(************************************)
(*                                  *)
(* DISKIO DOES ALL THE DISK CHECKING *)
(* TO SET UP THE BUFFER ARRAY WITH  *)
(* THE CHARACTER DATA.  IT FIRST    *)
(* LOOKS TO SEE IF THERE IS A FILE  *)
(* CALLED 'CHARS.DATA'. IF THERE IS, *)
(* IT WILL LOAD THAT CHARACTER SET. *)
(* OTHERWISE, IT WILL LOAD THE SET  *)
(* FROM THE FILE SYSTEM.CHARSET.    *)
(*                                  *)
(************************************)

PROCEDURE DISKIO;

       BEGIN
       (*$I-*)
       RESET (DISKDATA,'CHARS.DATA');
       SUCCESSFUL :=(IORESULT=0);
       IF NOT SUCCESSFUL THEN
          BEGIN
          RESET (DISK,'SYSTEM.CHARSET');
          BLOCK := BLOCKREAD(DISK,BUFFER,2,0);
          CLOSE (DISK,LOCK);
          REWRITE (DISKDATA,'CHARS.DATA');
          BLOCK := BLOCKWRITE(DISKDATA,BUFFER,2,0);
          SUCCESSFUL :=(IORESULT=0);
          IF NOT SUCCESSFUL THEN
             BEGIN
                PAGE(OUTPUT);
                WRITELN ('<ERROR> POSSIBLY NO MORE ROOM ON DISK');
                HALT;
                END;
             END
          (*$I+*)
          ELSE
             BLOCK := BLOCKREAD(DISKDATA,BUFFER,2,0);
          END;


BEGIN (* MAIN PROGRAM *)
DISKIO;
DRAWGRID;
DRAWOPTIONS;
MAKE_CURSOR;
FILLARRAY;
BLOCK := BLOCKWRITE(DISKDATA,BUFFER,2,0);
CLOSE (DISKDATA,LOCK);
PAGE(OUTPUT);
TEXTMODE;
END.

(******************************)
(*                            *)
(*      GRAPHICS EDITOR       *)
(*                            *)
(*            BY              *)
(*                            *)
(*    JEFFREY MANGASARIAN     *)
(*                            *)
(******************************)
PROGRAM GEDIT;
USES TURTLEGRAPHICS;
```



LET YOUR APPLE SEE THE WORLD!

The DS-65 Digisector® opens up a whole new world for your Apple II. Your computer can now be a part of the action, taking pictures to amuse your friends, watching your house while you're away, taking computer portraits . . . the applications abound! The DS-65 is a random access video digitizer. It converts a TV camera's output into digital information your computer can process. The DS-65 features:

- **High Resolution** — a 256 × 256 picture element scan
- **Precision** — 64 levels of grey scale
- **Versatility** — Accepts either NTSC or industrial video input
- **Economy** — A professional tool priced for the hobbyist



HI-RES PICTURE USING THE DS-65 AND PICTURE SCANNER SOFTWARE

The DS-65 is an intelligent peripheral card with on-board software in 2708 EPROM. Check these software features:

- Full screen scans directly to Apple Hi-Res screen
- Easy random access digitizing by Basic programs
- Line-scan digitizing for reading charts or tracking objects
- Utility functions for clearing and copying the Hi-Res screen

Use the DS-65 for precision security systems; computer portraiture; robotics; fast to slow scan conversion; moving target indicators; reading UPC codes, musical scores and paper tape and more! **GIVE YOUR APPLE THE GIFT OF SIGHT!** DS-65 Price: $349.95 / FSII Camera Price: $299.00 / Combination Price: $599.00

ADDITIONAL SOFTWARE FOR THE DS-65

—Picture Scanner: Provides a variety of different dithering algorithms for compressing the digitized image into the Hi-Res screen. Available on 13-sector disk. Price: $39.95

—Superscan: Enables you to enhance the DS-65's Hi-Res pictures with colors! Choose from 21 different colors and assign them to grey scale values, modify pictures, zoom, enhance contrast, etc. Print routines for the Anadex and Paper Tiger* are provided. Comes on a 13-sector disk. Written for The Micro Works by Magna Soft. Price: $79.95

—Portrait System Software: This program includes captions and a credit line, reverse printing for T-shirt application and the option to save portraits on disk. Specifically for use with a Malibu 165 printer. Call or write for more information.

*Paper Tiger is a trademark of Integral Data Systems, Inc.

MasterCharge/Visa Accepted

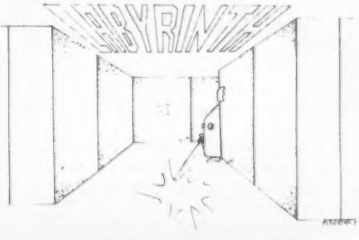
THE MICRO WORKS P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CIRCLE 191 ON READER SERVICE CARD

QUALITY SOFTWARE FOR TRS-80 COLOR AND OSI

QUEST – A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time.
16K COLOR-80 OR TRS-80 or 12KOSI. $14.95.

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER FOR OSI AND TRS-80 COLOR MACHINES!!! The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, RETURN, END, PRINT, STOP, USR(X), PEEK, POKE, *, /, +, -, X, X, =, VARIABLE NAMES A-Z, A SUBSCRIPTED VARIABLE, and INTEGER NUMBERS FROM 0 - 64K.
TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20 page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI or TRS-80 Color.



LABYRINTH – 16K EXTENDED COLOR BASIC – With amazing 3D graphics, you fight your way through a maze facing real time monsters. The graphics are real enough to cause claustrophobia. The most realistic game that I have ever seen on either system. $14.95. (8K on OSI)

VENTURER!—A fast action all machine code Arcade game that feels like an adventure. Go berserk as you sneak past the DREADED HALL MONSTERS to gather treasure in room after room, killing the NASTIES as you go. Great color, high res graphics, sound and Joystick game for the TRS-80 Color or OSI machines. (black and white and silent on OSI.) Tape only. $19.95.

AARDVARK - 80
2352 S. Commerce, Walled Lake, MI 48088
TRS 80 COLOR (313) 669-3110 OSI

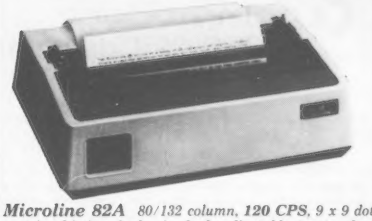
CIRCLE 101 ON READER SERVICE CARD

Cyrillic, continued...

```
(*******************************)
(*                             *)
(*  VAR TABLE                  *)
(*                             *)
(*  XVECTOR : DISTANCE FOR     *)
(*            HORZ. COMPONENT  *)
(*                             *)
(*  YVECTOR : DISTANCE FOR     *)
(*            VERT. COMPONENT  *)
(*                             *)
(*  X,Y     : CURSOR POSITION  *)
(*                             *)
(*  XO,YO   : PREVIOUS CURSOR  *)
(*            POSITON          *)
(*                             *)
(*******************************)
VAR XVECTOR,YVECTOR,I,X,Y,XO,YO : INTEGER;
    CURSOR,CTRLC,CTRLI,ESCAPE,UP,DOWN,LEFT,RIGHT,CH : CHAR;

(*******************************)
(*                             *)
(*  MAXMIN : TEST TO SEE IF    *)
(*  THE LOCATION TO BE DRAWN   *)
(*  IS ON THE HIRES SCREEN     *)
(*                             *)
(*******************************)
PROCEDURE MAXMIN;

   BEGIN
   IF X>39 THEN
      X := 39;
   IF X<0 THEN
      X := 0;
   IF Y>23 THEN
      Y := 23;
   IF Y<1 THEN
      Y :=1;
   END;

(*******************************)
(*                             *)
(* DRAWXY  DRAWS A  CHARACTER  *)
(* ON THE HI-RES SCREEN        *)
(*                             *)
(*******************************)
PROCEDURE DRAW(X1,Y1,GMODE : INTEGER; LETTER:CHAR);

    BEGIN
    MOVETO(X1*7,191-Y1*8);
    CHARTYPE(GMODE);
    WCHAR(LETTER);
    END;

(*******************************)
(*                             *)
(* EXCHANGES CHARACTERS EITHER *)
(* VERT. OR HORZ. DEPENDING    *)
(* ON WHICH COMMAND WAS        *)
(* SELECTED                    *)
(*                             *)
(*******************************)
PROCEDURE EXCHANGE;
   VAR BYTE : CHAR;

   BEGIN
   READ(KEYBOARD,BYTE);
   WHILE BYTE<>CTRLC DO
      BEGIN
      IF EOLN(KEYBOARD) THEN
          BEGIN
          MAXMIN;
          DRAW(X,Y,6,CURSOR);
          X := 0;
          Y := Y+1;
          MAXMIN;
          DRAW(X,Y,6,CURSOR);
          END
      ELSE
          BEGIN
          MAXMIN;
          DRAW(X,Y,10,BYTE);
          X := X+XVECTOR;
          Y := Y+YVECTOR;
          MAXMIN;
          DRAW(X,Y,6,CURSOR);
          END;
      READ(KEYBOARD,BYTE);
      END;
   MAXMIN;
   DRAW(X,Y,6,CURSOR);
   END;

(*******************************)
(*                             *)
(* EDITSCREEN ALLOWS THE       *)
(* MOVEMENT OF THE CURSOR      *)
(* AND CALLS THE EXCHANGE      *)
(* ROUTINE                     *)
(*                             *)
(*******************************)
PROCEDURE EDITSCREEN;

      BEGIN
      MAXMIN;
      DRAW(X,Y,6,CURSOR);
      READ(KEYBOARD,CH);
      WHILE CH<>ESCAPE DO
          BEGIN
          XO :=X;
          YO := Y;
          IF EOLN(KEYBOARD) THEN
             BEGIN
             X :=-1;
             Y := Y+1;
             END;
          IF CH=LEFT THEN
             X := X-1;
          IF CH=CTRLI THEN
             X := X+5;
          IF (CH=RIGHT) OR (CH=' ') THEN
             X := X+1;
          IF CH=DOWN THEN
              Y :=Y-1;
          IF CH=UP THEN
              Y := Y+1;
          IF (CH='h') OR (CH='H') THEN
             BEGIN
             XVECTOR :=1;
             YVECTOR :=0;
             EXCHANGE
             END
          ELSE
              IF (CH='v') OR (CH='V') THEN
                 BEGIN
                 XVECTOR :=0;
                 YVECTOR :=1;
                 EXCHANGE
                 END
              ELSE
                 DRAW(XO,YO,6,CURSOR);
          MAXMIN;
          DRAW(X,Y,6,CURSOR);
          READ(KEYBOARD,CH);
          END;
      END;

(*******************************)
(*                             *)
(* STARTUP INITS THE           *)
(* PARAMETERS FOR THE PROGRAM  *)
(*                             *)
(*******************************)
PROCEDURE STARTUP;

      BEGIN
      X :=0;
      Y :=1;
      XVECTOR := 1;
      YVECTOR := 0;
      UP := CHR(12);
      DOWN := CHR(15);
      LEFT := CHR(8);
      RIGHT:= CHR(21);
      ESCAPE := CHR(27);
      CTRLC  := CHR(3);
      CTRLI  := CHR(9);
      CURSOR := CHR(127);
      PAGE(OUTPUT);
      GOTOXY(5,5);
      WRITE ('1) GRAPHMODE  2) INITTURTLE :');
      READLN(I);
      IF I=2 THEN
         INITTURTLE;
      GRAFMODE;
      END;

   BEGIN   (* MAIN PROGRAM *)
   STARTUP;
   EDITSCREEN;
   PAGE(OUTPUT);
   TEXTMODE;
   END.
```

Orange County • Sunnyvale
San Diego • Los Angeles
San Fernando Valley • Dallas

BETTER THAN EPSON ! - Okidata



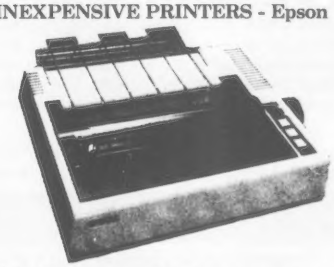
Microline 82A *80/132 column,* ***120 CPS****, 9 x 9 dot matrix, friction feed, pin feed, adjustable tractor feed (optional), handles 4 part forms up to 9.5" wide, rear & bottom feed, paper tear bar, 100% duty cycle/200,000,000 character print head, bi-directional/logic seeking,* ***both serial & parallel interfaces included****, front panel switch & program control of 10 different form lengths, uses inexpensive spool type ribbons, double width & condensed characters, true lower case descenders & graphics*
PRM-43082 *Friction & pin feed* **$499.95**

Microline 83A *132/232 column, 120 CPS, handles forms up to 15" wide, removable tractor, plus all the features of the 82A.*
PRM-43083 *with FREE tractor* **$744.95**

Microline 84 *132/232 column, 200 CPS, full dot graphics built in, handles forms up to 15" wide, plus all the features of the 83A.*
PRM-43083 *with FREE tractor* ... **$1149.95**

PRA-27081 *Apple card* **$39.95**
PRA-27082 *Apple cable* **$19.95**
PRA-27087 *TRS-80 cable* **$24.95**
PRA-43081 *2K hi spd serial card* .. **$169.95**
PRA-43082 *Graphics ROMs 82A* **$79.95**
PRA-43083 *Graphics ROMs 83A* **$79.95**
PRA-43088 *Tractor option 82A* **$39.95**
PRA-43080 *Extra ribbons pkg. of 2* ... **$9.95**

INEXPENSIVE PRINTERS - Epson



MX-70 *80 column, 80 CPS, 5 x 7 dot matrix, adjustable tractor feed, & graphics*
PRM-27070 *List $459* **$389.95**

MX-80 *80 column, 80 CPS, bi-directional/logic seeking printing, 9 x 9 dot matrix, adjustable pin feed, & 54 graphics characters*
PRM-27080 *List $645* **$429.95**

MX-80FT *same as MX-80 with friction feed added.*
PRM-27082 *List $745* **$529.95**

MX-100 *132 column, correspondence quality, graphics, up to 15" paper, friction feed & adjustable pin feed, 9 x 9 dot matrix, 80 CPS.*
PRM-27100 *List $945* **$724.95**

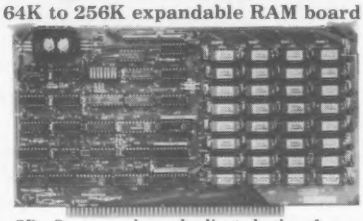
PRA-27084 *Serial interface* **$54.95**
PRA-27088 *Serial intf & 2K buffer* .. **$144.95**
PRA-27081 *Apple card* **$39.95**
PRA-27082 *Apple cable* **$19.95**
PRA-27086 *IEEE 488 card* **$52.95**
PRA-27087 *TRS-80 cable* **$24.95**
PRA-27085 *Graftrax II* **$75.00**
PRA-27090 *Extra print head* **$44.95**
PRA-27083 *MX-80 ribbon cart.* **$13.95**
PRA-27101 *MX-100 ribbon only* **$9.95**

16K RAM Card for Apple II was $175, Now Only $74.95

Expand your Apple's memory from 48K to 64K with this assembled & tested RAM Card that just plugs right into your Apple. Take advantage of this half price sale !!!

MEX-16700A *16K RAM Card* **$74.95**

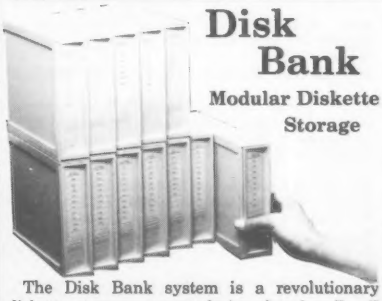
SD Systems
ExpandoRAM III
64K to 256K expandable RAM board



SD Systems has duplicated the famous reliability of their ExpandoRAM I and II boards in the new ExpandoRAM III, a board capable of containing 256K of high speed RAM. Utilizing the new 64K x 1 dymanic RAM chips, you can configure a memory of 64K, 128K, 192K, or 256K, all on one S-100 board. Memory address decoding is done by a programmed bipolar ROM so that the memory map may be dip-switch configured to work with either COSMOS/MPM-type systems or with OASIS-type systems.

Extensive application notes concerning how to operate the ExpandoRAM III with Cromemco, Intersystems, and other popular 4 MHz Z-80 systems are contained in the manual.

MEM-65064A *64K A & T* **$424.95**
MEM-65128A *128K A & T* **$494.95**
MEM-65192A *192K A & T* **$559.95**
MEM-65256A *256K A & T* **$595.00**



Disk Bank
Modular Diskette Storage

The Disk Bank system is a revolutionary diskette storage concept designed to handle all your diskette storage needs no matter how small or large.

The Disk Bank system can grow as your storage needs grow. Its modular interlocking design allows you to add to your system horizontally or verticallly. And Disk Bank's design allows easy accss to your diskettes. Just open the drawer and slide it out. The diskette retaining gate falls forward automatically for easy access to any of the 10 diskettes, without fear of bending or crimping. Shipping weight 1 lb.

MMA-405 *5¼" Disk Bank* **$4.95**
MMA-408 *8" Disk Bank* **$5.95**

Modems on Sale !!!!

SIGNALMAN - Anchor
Direct-connect automatic answer/originate selection, 300 Baud full duplex, Bell 103, includes RS-232 cable
IOM-5600A *Signalman* **$98.50**

SMARTMODEM - Hayes
Sophisticated direct-connect auto-answer/auto-dial modem, touch-tone or pulse dialing, RS-232C interface, programmable
IOM-5400A *Smartmodem* **$249.95**
IOK-1500A *Hayes Chronograph* ... **$219.95**
IOM-2010A *Micromodem II* **$329.95**
IOM-1100A *Micromodem 100* **$375.00**

Apple-CAT - Novation
Software selectable 1200 or 300 Baud, direct connect, auto-answer/auto-dialse dialing, auxiliary 3-wire RS-232C serial port for printer
IOM-5232A *Save $50.00* **$325.00**

FMJ Inc
Printer Pal
Model P80 & P100

P80 dimensions: 14½" wide, 13" deep, 4½" high • P100 dimensions: 21" wide, 13" deep, 5½"high • Stores paper below printer • Constructed of 16 gauge steel • Attractive textured finish • Plastic trim and rubber feet • Adjustable paper support brackets.

The Printer Pal is a very simple, but convenient paper rack and printer stand. The Model P80 will support an 80 column printer such as the Epson MX80/MX80FT or the Okidata 82A. The Model P100 supports the larger 132 column printers like the Epson MX100 or the Okidata 83A. Either model performs the same function; to act as a stand for your printer while keeping your paper straight and tidy so you can spend your time computing instead of realigning your printer paper.

PRA-99080 *P80, 10 lbs* **$24.95**
PRA-99100 *P100, 12 lbs* **$29.95**

Place Orders Toll Free

Continental U.S. **800-421-5500**
Inside California **800-262-1710**

For Technical Inquires or Customer Service call:
213-973-7707

JADE
Computer Products

4901 W. Rosecrans, Hawthorne, Ca 90250

TERMS of SALE: Cash, checks, credit cards, or Purchase Orders from qualified firms and institutions. **Minimum Order $15.00.** California residents add 6% tax. Minimum shipping & handling charge $3.00. **Pricing & availibility subject to change**

CIRCLE 168 ON READER SERVICE CARD

JADE
Computer Products
3313 S. Bristol St.
Santa Ana, Calif.
714-549-7108

JADE
Computer Products
1291 W. El Camino Real
Sunnyvale, Calif.
415-965-7980

JADE
Computer Products
4344 Convoy Street
Kearny Mesa, Calif.
714-268-4661

PLACE ORDERS TOLL FREE.

Continental U.S. - 800-421-5500
Inside California - 800-262-1710
Los Angeles Area - 213-973-7707

JADE Disk Sub-Systems

Shugart, Siemens, Qume

Handsome metal cabinet with proportionally balanced air flow system • Rugged dual drive power supply • Power cable kit • Power switch, line cord, fuse holder, cooling fan • Never-Mar rubber feet • All necessary hardware to mount 2-8" disk drives, power supply, and fan • Does not include signal cable

Dual 8" Subassembly Cabinet

END-000420 *Bare cabinet* **$59.95**
END-000421 *Cabinet kit* **$225.00**
END-000431 *A & T* **$359.95**

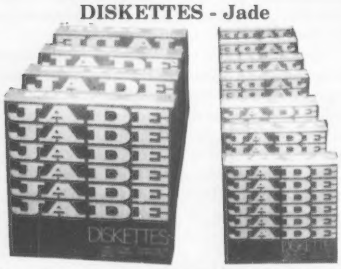
8" Disk Drive Subsystems
Single Sided, Double Density

END-000423 *Kit w/2 FD100-8Ds* . **$924.95**
END-000424 *A & T w/2 FD100-8Ds* **$1124.95**
END-000433 *Kit w/2 SA-801Rs* ... **$999.95**
END-000434 *A & T w/2 SA-801Rs* **$1195.00**

8" Disk Drive Subsystems
Double Sided, Double Density

END-000426 *Kit w/2 DT-8s* **$1224.95**
END-000427 *A & T w/2 DT-8s* ... **$1424.95**
END-000436 *Kit w/2 SA-851Rs* .. **$1295.00**
END-000437 *A & T w/2 SA-851Rs* **$1495.00**

DISKETTES - Jade



We proudly put our name on these high quality diskettes guaranteed to satisfy you or your money back.

5¼" Diskettes, Box of Ten

MMD—5110103 *SS, SD, 01S* **$29.00**
MMD—5111003 *SS, SD, 10S* **$29.00**
MMD—5111603 *SS, SD, 16S* **$29.00**
MMD—5120103 *SS, DD, 01S* **$31.00**
MMD—5121003 *SS, DD, 010* **$31.00**
MMD—5121603 *SS, DD, 16S* **$31.00**

8" Diskettes, Box of Ten

MMD—8110103 *SS, SD, 01S* **$31.00**
MMD—8120103 *SS, DD, 01S* **$39.00**
MMD—8220103 *DS, DD, 01S* **$48.00**

EPROM ERASER - Spectronics

Ultra-violet EPROM erasers

XME-3100A *With out timer* **$69.50**
XME-3101 *With timer* **$94.50**
XME-3200 *Economy Model* **$39.95**

16K MEMORY UPGRADE

Add 16K of RAM to your TRS-80, Apple, or Exidy in just minutes. We've sold thousands of these 16K RAM upgrades which include the appropriate memory chips (as specified by the manufacturer), all necessary jumper blocks, fool-proof instructions, and our 1 year guarantee.

MEX-16100K *TRS-80 kit* **$25.00**
MEX-16101K *Apple kit* **$25.00**
MEX-16102K *Exidy kit* **$25.00**

16K RAM CARD - for Apple II

Expand your Apple to 64K, 1 year warranty

MEX-16700A *Save $125.00 !!!* **$74.95**

Z-80* CARD for APPLE

Two computers in one, Z-80 & 6502, more than doubles the power & potential of your Apple, includes Z-80 CPU card, CP/M 2.2, & BASIC-80*

CPX-30800A *A & T* **$299.95**

8" DISK CONTROLLER

New from Vista Computer, single or double sided, single or double density, compatible with DOS 3.2/3.3, Pascal, & CPM 2.2, Shugart & Qume compatible

IOD-2700A *A & T* **$499.95**

2 MEGABYTES for Apple II

Complete package includes: Two 8" double-density disk drives, Vista double-density 8" disk controller, cabinet, power supply, & cables, DOS 3.2/3.3, CP/M 2.2, & Pascal compatible.

1 MegaByte Package *(Kit)* **$1495.00**
1 MegaByte Package *(A & T)* **$1695.00**
2 MegaByte Package *(Kit)* **$1795.00**
2 MegaByte Package *(A & T)* **$1995.95**

Apple-CAT - Novation

Software selectable 1200 or 300 baud, direct connect, auto-answer/auto-dial, auxiliary 3-wire RS232C serial port for printer.

IOM-5232A *Save $50.00!!!* **$334.95**

DISK DRIVES - Micro Sci

Inexpensive disk drives for your Apple

A2 *Direct replacement for Apple Disk II, works with Apple II controller as first or second drive.*

MSM-123101 *Micro Sci A2* **$429.95**
MSM-123101C *A2 with contrlr* **$499.95**

A40 *40 track drive for Apple II. Improved storage capacity and speed over Apple Brand drives - requires Micro Sci controller.*

IOD-2340A *Micro Sci A40* **$399.95**

A70 *70 track drive for Apple II. Twice the storage capacity and three times faster than Apple Brand drives - requires Micro Sci controller*

IOD-2370A *Micro Sci A70* **$499.95**

Micro Sci Controller *Disk controller for up to two Micro Sci A40 or A70 disk drives, DOS 3.2, 3.3, Pascal, and Z-80 SoftCard compatible, includes utility disk and 40/70 track patch.*

IOD-2300A *Micro Sci controller* **$95.00**

VISION 80 - Vista Computer

80 column x 24 line video card for Apple II, 128 ASCII characters, upper and lower case, 9 x 10 dot matrix with 3 dot descenders, standard data media terminal control codes, CP/M Pascal & Fortran compatible, 50/60 Hz

IOV-2400A *Vista Vision 80* **$375.00**

Joystick - T G Products

A better joystick for your Apple II

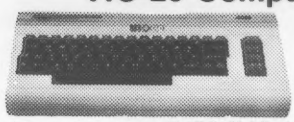
SYA-1512A *A & T* **$49.95**

CPS MULTICARD - Mtn. Computer

Three cards in one! Real time clock/calendar, serial interface, & parallel interface - all on one card.

IOX-2300A *A & T* **$179.95**

Commodore VIC-20 Computer



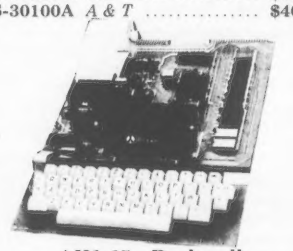
Complete personal computer with 5K RAM, full color, 61 key keyboard, 4 dual special-function keys, serial ports, cassette port, composite video output (connects to standard color TV set), BASIC language, & expansion port.

COM-VIC20 *VIC-20* **$279.95**

Z-80 STARTER KIT - SD Systems

Complete Z-80 microcomputer with RAM, ROM, I/O, keyboard, display, kludge area, manual, & workbook

CPS-30100K *KIT* **$299.95**
CPS-30100A *A & T* **$469.95**



AIM-65 - Rockwell

6502 computer with alphanumeric display, printer, & keyboard, and complete instructional manuals

CPK-50165A *1K AIM-65* **$424.95**
CPK-50465A *4K AIM-65* **$474.95**
SFK-74600008E *8K BASIC ROM* ... **$64.95**
SFK-64600004E *4K Assembler ROM* **$43.95**
PSX-030A *Power Supply* **$64.95**
ENX-000002 *Enclosure* **$54.95**
SFK-74600020E *PL/65 ROM* **$84.95**
SFK-74600010E *Forth ROM* **$64.95**
SFK-74600030E *Instant Pascal* **$99.95**

Special Packages

4K AIM-65, 8K BASIC, power supply & enclosure

Special Package Price **$649.95**

Video Monitors

HI-RES 12" GREEN - Zenith

15 MHz bandwidth, 700 lines/inch, P31 green phosphor, switchable 40 or 80 columns, small, light-weight & portable.

VDM-201201 *List price $150.00* **$118.95**

12" GREEN SCREEN - NEC

20 MHz, P31 phosphor video monitor with audio, exceptionally high resolution - A fantastic monitor at a very reasonable price

VDM-651200 *Special Sale Price* **$169.95**

12" COLOR MONITOR - NEC

Hi-res monitor with audio & sculptured case

VDC-651212 *Color Monitor* **$479.95**
NEC-1202D *RGB color monitor* ... **$1045.00**

Leedex / Amdek

Reasonably priced video monitors

VDC-801310 *13" Color I* **$379.95**
VDC-801320 *Color II* **$895.00**
IOV-2300A *DVM board for Apple* .. **$199.95**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

JADE
Computer Products
13440 S. Hawthorne Blvd.
Hawthorne, Calif.
213-973-7330

JADE
Computer Products
21800 Ventura Blvd.
Woodland Hills, Calif.
213-716-6120

JADE
Computer Products
4950 Beltline Road
Addison, Texas
214-458-2782

PLACE ORDERS TOLL FREE.

Continental U.S. - 800-421-5500
Inside California - 800-262-1710
Los Angeles Area - 213-973-7707

SBC-200 - SD Systems
4 MHz Z-80A CPU with serial & parallel I/O, 1K RAM, 8K ROM space, monitor PROM included.
CPC-30200A *A & T* **$299.95**

THE BIG Z* - Jade
2 or 4 MHz switchable Z-80 CPU with serial I/O, accomodates 2708, 2716, or 2732 EPROM, baud rates from 75 to 9600*
CPU-30201K *Kit* **$139.95**
CPU-30201A *A & T* **$189.95**
CPU-30200B *Bare board* **$35.00**

2810 Z-80* CPU - Cal Comp Sys
2/4 MHz Z-80A CPU with RS-232C serial I/O port and on-board MOSS 2.2 monitor PROM, front panel compatible.*
CPU-30400A *A & T* **$269.95**

CB-2 Z-80 CPU - S.S.M.
2 or 4 MHz Z-80 CPU board with provision for up to 8K of ROM or 4K of RAM on board, extended addressing, IEEE S-100, front panel compatible.
CPU-30300K *Kit* **$239.95**
CPU-30300A *A & T* **$299.95**

16K STATIC RAM - Mem Merchant
4 MHz 16K static RAM board, IEEE S-100, bank selectable, Phantom capability, addressable in 4K blocks, "disable-able" in 1K segments, extended addressing, low power
MEM-16171A *A & T* **$154.95**

32K STATIC RAM - Jade
2 or 4 MHz expandable static RAM board uses 2114L's
MEM-16151K *16K 4 MHz kit* **$169.95**
MEM-32151K *32K 4 MHz kit* **$299.95**
Assembled & tested ..... add **$50.00**

MEMORY BANK - Jade
4 MHz, S-100, bank selectable, expandable from 16K to 64K
MEM-99730B *Bare Board* **$49.95**
MEM-99730K *Kit no RAM* **$199.95**
MEM-32731K *32K Kit* **$239.95**
MEM-64733K *64K Kit* **$279.95**
Assembled & Tested ..... add **$50.00**

64K RAM - Calif Computer Sys
4 MHz bank port / bank byte selectable, extended addressing, 16K bank selectable, PHANTOM line allows memory overlay, 8080 / Z-80 / front panel compatible.
MEM-64565A *A & T* **$575.00**

64K STATIC RAM - Mem Merchant
64K static S-100 RAM card, 4-16K banks, up to 8MHz
MEM-64400A *A & T* **$594.95**

64K STATIC RAM - SSM
IEEE 696/S-100 standard, up to 6MHz/8 Bit, 12MHz/16 Bit, 24 Bit extended addressing, disable-able in 2K increments
MEM-64300A *A & T* **$749.95**

64K STATIC - Lab Standard
Absolute IEEE 696/S-100 compliance, 8 or 16 Bit data paths, 16-bit request/acknowledge properly implemented, supports DMA at 8MHz, switchable bank select system for use with Cromemco & Alpha Micro
MEM-64900A *A & T* **$699.95**

BUS PROBE - Jade
S-100 diagnostic analyzer board, dynamic visual display of all 96 IEEE S-100 signals, aids in real time analysis of faulty hardware and software
TSX-200B *Bare Board* **$59.95**
TSX-200K *Kit* **$119.95**
TSX-200A *A & T* **$149.95**

VERSAFLOPPY II - SD SYSTEMS
Double density disk controller for any combination of 5¼" or 8" single or double sided disk drives, analog phase-locked loop data separator, vectored interrupt, CP/M 2.2 & OASIS compatible, control/diagnostic software PROM included
IOD-1160A *A & T* **$359.95**
SFC-55009047F *CP/M 2.2 for VF II* . **$99.95**

DOUBLE-D - Jade
Double density controller with the inside track, on-board Z-80A, printer port, IEEE S-100, can function on an interrupt driven buss*
IOD-1200K *Kit* **$299.95**
IOD-1200A *A & T* **$375.00**
IOD-1200B *Bare board* **$59.95**

DOUBLE DENSITY - Cal Comp Sys
5¼" and 8" disk controller, single or double density, with on-board boot loader ROM, and free CP/M 2.2 and manual set.*
IOD-1300A *A & T* **$374.95**

MPC-4 - SD Systems
Intelligent 4-port serial I/O card, on-board Z-80A, 2K RAM, 4K PROM area, on-board firmware, fully buffered, vectored interrupts, four CTC channels, add to SD Board set for powerful multi-user system
IOI-1504A *A & T w/software* **$495.00**

I/O-4 - S.S.M.
2 serial I/O ports plus 2 parallel I/O ports
IOI-1010K *Kit* **$179.95**
IOI-1010A *A & T* **$249.95**
IOI-1010B *Bare board* **$35.00**

I/O-5 - SSM Microcomputer
Two serial & 3 parallel I/O ports, 110-19.2K Baud
IOI-1015A *A & T* **$279.95**

I/O-8 - SSM Microcomputer
Eight software programmable serial I/O ports, 110 -19.2K Baud, ideal for multi-user systems
IOI-1018A *A & T* **$449.95**

PROM-100 - SD Systems
2708, 2716, 2732 EPROM programmer w/software
MEM-99520K *Kit* **$189.95**
MEM-99520A *A & T* **$249.95**

PB-1 - S.S.M.
2708, 2716 EPROM board with built-in programmer
MEM-99510K *Kit* **$154.95**
MEM-99510A *A & T* **$219.95**

EPROM BOARD - Jade
16K or 32K uses 2708's or 2716's, 1K boundary
MEM-16230K *Kit* **$79.95**
MEM-16230A *A & T* **$119.95**

ISO-BUS - Jade
Silent, simple, and on sale - a better motherboard
6 Slot (5¼" x 8¾")
MBS-061B *Bare board* **$19.95**
MBS-061K *Kit* **$39.95**
MBS-061A *A & T* **$49.95**
12 Slot (9¾" x 8¾")
MBS-121B *Bare board* **$29.95**
MBS-121K *Kit* **$69.95**
MBS-121A *A & T* **$89.95**
18 Slot (14½" x 8¾")
MBS-181B *Bare board* **$49.95**
MBS-181K *Kit* **$99.95**
MBS-181A *A & T* **$139.95**

Single User System
SBC-200, 64K ExpandoRAM II, Versafloppy II, CP/M 2.2

$1095.00

4 MHz Z-80A CPU, 64K RAM, serial I/O port, parallel I/O port, double-density disk controller, CP/M 2.2 disk and manuals, system monitor, control and diagnostic software.
Board set with 256K of RAM **$1295.00**
-All boards are assembled and tested-

8" Disk Drives

Shugart SA801R *single-sided double-density*
MSF-10801R .. $394.95 ea 2 for **$389.95 ea**

Shugart SA851R *double-sided double-density*
MSF-10851R .. $554.95 ea 2 for **$529.95 ea**

Qume DT-8 *double-sided double-density*
MSF-750080 .. $524.95 ea 2 for **$499.95 ea**

Siemens FDD 100-8 *sngl-sided dbl-density*
MSF-201120 .. $384.95 ea 2 for **$349.95 ea**

5¼" Disk Drives

Shugart SA400L *sngl-sided dbl-density 40 track*
MSM-104000 .. $234.95 ea 2 for **$224.95 ea**

Shugart SA450 *dbl-sided dbl-density 70 track*
MSM-104500 .. $349.95 ea 2 for **$329.95 ea**

Qume DT-5 *dbl-sided dbl-density 80 track*
MSM-750050 .. $359.95 ea 2 for **$349.95 ea**

MPI B-51 *sngl-sided dbl-density 40 track*
MSM-155100 .. $234.95 ea 2 for **$224.95 ea**

MPI B-52 *dbl-sided dbl-density 40 track*
MSM-155200 .. $344.95 ea 2 for **$334.95 ea**

MPI B-91 *sngl-sided dbl-density 77 track*
MSM-155300 .. $369.95 ea 2 for **$359.95 ea**

MPI B-92 *dbl-sided dbl-density 77 track*
MSM-155400 .. $469.95 ea 2 for **$459.95 ea**

ISOBAR - GSC

Isolates & protects your valuable equipment from high voltage spikes & AC line noise, inductive isolated ground, 15 amp circuit breaker, U.L. listed
EME-115103 *3 socket* **$39.50**
EME-115105 *4 socket* **$49.50**
EME-115100 *8 socket* **$54.50**
EME-115110 *9 socket rackmount* **$74.50**

Prices may be slightly higher at our retail locations. Please call the store nearest you for local price and availability.

CIRCLE 168 ON READER SERVICE CARD

Printing Apple Low-Resolution Graphics

Joseph J. Navarro

If you possess a printer with "dot-image" graphics capabilities, such as the Epson MX-80 with Graftrax-80, there are several programs on the market which you can use to print Apple high-resolution graphics screens. There does not, however, seem to be any such software available for printing the low-resolution graphics screen.

The program in Listing 1 contains two subroutines, spanning lines 14000 through 15340, which perform this task. The main routine of the program in lines 10 through 170 is simply an example of the way in which the subroutines are used. They are designed to be easily merged into any Applesoft program.

The first subroutine should be executed with a GOSUB 14000 instruction during initialization processing in your program. The second subroutine contains the actual print logic, and can be invoked at any point in your program with a GOSUB 15000 instruction. Whatever is present on the low-resolution graphics screen at the time that this second subroutine is invoked will then be printed.

How The Subroutines Work

The Epson MX-80 is a dot matrix printer; that is, each character it prints is actually composed of dots arranged within a matrix of nine rows and five columns. Thus the letter "E" is formed as follows:

```
. . . . .
.
.
. . .
.
.
. . . . .
```

Note that only seven of the possible nine rows are used for this upper-case letter. The other two rows are used for lower-case letters with "descenders," such as "g" and "p," and for underlining.

When operating in "dot-image" graphics mode, the printer interprets each character sent to it not as a printable character but rather as a byte containing a binary number composed of eight bits. Each such number represents one column of dots, and each column is printed immediately adjacent to the prior column, with no intervening space.

A dot will be printed within the column if its corresponding bit is on in the binary number. The top dot in the column maps to the high-order bit in the binary number, the bottom dot to the low-order bit.

The subroutine beginning at line 15000 sends to the printer six consecutive columns for each of the 1600 plotting positions on the low-resolution graphics screen. Incidentally, these plotting positions are described as "squares" in the Applesoft reference manual, but are actually rectangular on most monitor screens. All dot columns sent by the Apple are seven dots high, because the Apple is a seven-bit machine — it cannot send an eight-bit character over the Epson parallel interface. The printed block resulting from the six seven-dot columns sent to the printer is roughly proportional to the dimensions of the plotted screen rectangle.

The number of bits which are on — and therefore the number of dots which print in each of the columns — depends on the color of the corresponding plotted screen

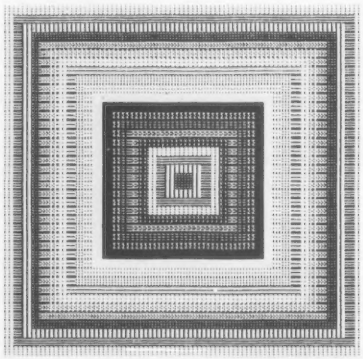


Figure 1. Horizontal Scale 1, Vertical Scale 1.

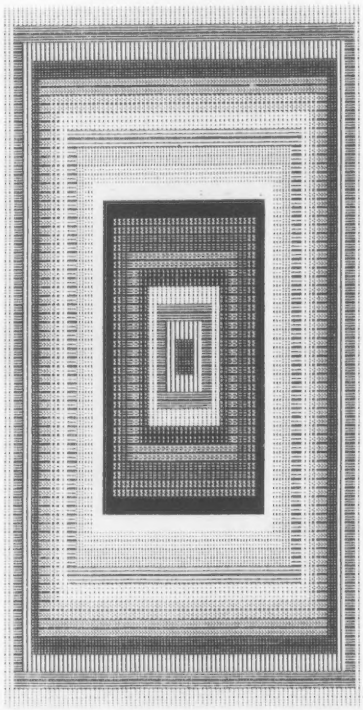


Figure 2. Horizontal Scale 1, Vertical Scale 2.

Joseph J. Navarro, 117 Chelsea Way, Bridgewater, NJ 08807

Figure	Horizontal Scale	Vertical Scale
1	1	1
2	1	2
3	2	1
4	2	2

Table 1.

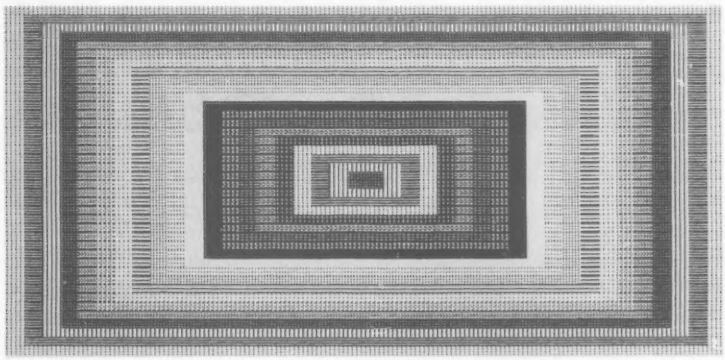


Figure 3. Horizontal Scale 2, Vertical Scale 1.

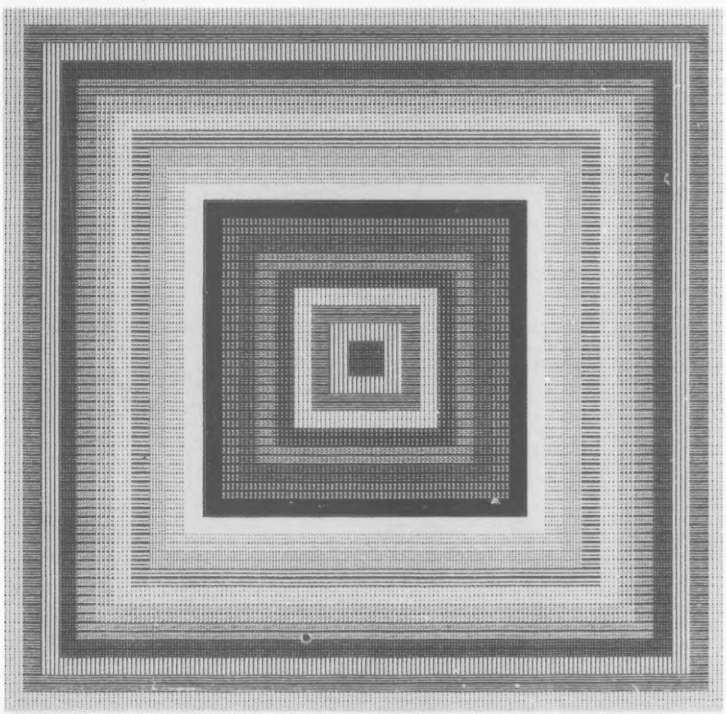


Figure 4. Horizontal Scale 2, Vertical Scale 2.

rectangle. Darker colors generate columns with more dots printed than do lighter colors. This varying density of dots results in correspondingly different shades of grey in each printed block of columns. In this way, an attempt is made to compensate for the lack of color capability in the printer.

Sample Program Results

Sample output from the program is shown in Figures 1 through 4, which resulted from the following combinations of print scale factors in Table 1.

In these Figures, the outermost box was plotted in color #5, which is a medium grey in the Apple spectrum.

The Initialization Subroutine

Line 14010 defines the control characters needed by the printer, DOS, and the parallel interface.

Lines 14020 through 14190 load the binary values for the 15 sets (one for each possible color) of six bytes per printed block. Line 14040 defines the most dense pattern, which is used for color #0 (black). Line 14190 defines the least dense pattern, which is used for color #15 (white).

Lines 14200 through 14250 define the horizontal and vertical print scale factors to be used when printing. A scale of 2 will double the size of the printed image in the dimension to which the scale is assigned. Using scale 2 increases printing time significantly.

The Printing Subroutine

Lines 15010 through 15020 send the DOS and parallel interface commands which change the output device (referenced in PRINT instructions) from the screen to the printer, and set the line width to 80 characters.

Line 15030 advances the printer to the top of the next page, in preparation for beginning the graphics print.

Line 15040 sends the printer command which sets the height of a line feed to 7/72" of paper. Since the Apple sends columns which are seven dots (bits) in height, and since a dot is 1/72" in diameter, this command insures that each row of printed graphics will immediately abut the row above it, with no intervening space.

Lines 15050 through 15290 are the heart of the print subroutine. A group of six nested FOR/NEXT loops actually generates the printed representation of the plotted low-resolution graphics screen. The loops, identified by the variable which controls each, are:

- The "Y" Loop — lines 15050 through 15290. This loop executes once for each of the 40 plotted rows on the screen.
- The "Z" Loop — lines 15055 through 15280. This loop executes either once or twice, depending on the chosen vertical print scale factor.
- The "S" Loop — lines 15056 through 15260. Each printed line is transmitted to

the printer in four separate patterns. This loop is executed once for each of those patterns, which are cleared in line 15057, filled by the loops described below, and then sent to the printer in line 15250. Line 15240, executed immediately before the pattern is sent, signals the printer that the forthcoming stream of data is a bit-image graphics string of either 60 or 120 bytes in length, depending on the chosen horizontal print scale factor.

- The "X" Loop — lines 15060 through 15230. Each pattern printed by the "S" loop described above maps to ¼ of a plotted row from the low-resolution graphics screen. This ("X") loop is executed once for each of the 10 plotted spots in each of those ¼ rows. Line 15070 checks the color of the spot and stores it for later use by the "U" loop described below.
- The "V" Loop — lines 15080 through 15220. This loop executes either once or twice, depending on the chosen horizontal print scale factor.
- The "U" Loop — lines 15090 through 15210. This loop executes six times. Its purpose is to add to the developing print pattern the six sets of binary values which will generate the shade of grey matching the color which was saved during execution of the "X" loop.

Line 15300 advances the paper to the top of the next page after the entire low-resolution graphics screen has been processed.

Line 15310 reinitializes the printer to its default values.

Lines 15320 through 15330 re-direct output generated by the PRINT instruction back to the screen.

The Main Routine

Line 10 invokes the initialization subroutine.

Line 15 sets the normal Apple low-resolution graphics mode (see **Using Full-Screen Graphics** below).

Lines 20 through 110 generate a graphics pattern of nested boxes on the low-resolution graphics screen. Line 20 chooses the color for the outermost box at random.

Line 120 invokes the printing subroutine.

Lines 130 through 170 determine if another print is desired. If not, the program terminates. If another print is desired, then the portion of the initialization subroutine which sets the print scale factors is invoked and then the program branches to line 120 for printing.

Using Full-Screen Graphics

These low-resolution graphics print subroutines are written for use with an Applesoft program that uses the "mixed-graphics-plus-text" mode which is invoked by the GR instruction. This mode provides graphics plotting on a 40 by 40 plot matrix at the top of the screen, together with four text lines at the bottom of the screen.

The Apple also provides a "full-screen" low-resolution graphics capability. In this mode, which is invoked by POKEing 0 to address –16302 after the GR instruction has been issued, graphics plotting is done on a full-screen matrix of 48 lines, each containing 40 plotting positions, with no text print facility on the screen.

In order to use these subroutines with an Applesoft program using full-screen low-resolution graphics plotting, simply change the 39 in line 15050 to 47 so that it reads:

15050 FOR Y = 0 TO 47

This will extend the scan/print iteration to the eight additional graphic lines. □

Listing 1.

```
10  GOSUB 14000
15  GR
20 T =  INT ( RND (1) * 16)
30  FOR R = 0 TO 19
40 T = T + 1
50  IF T > 15 THEN T = 0
60  COLOR= T
70  HLIN R,39 - R AT R
80  VLIN R,39 - R AT 39 - R
90  HLIN 39 - R,R AT 39 - R
100  VLIN 39 - R,R AT R
110  NEXT R
120  GOSUB 15000
130  PRINT "PRINT AGAIN? ": GET RESPNSE$
140  IF RESPNSE$ <  > "Y" THEN  END
150  PRINT
160  GOSUB 14200
170  GOTO 120
14000  REM  *** INITIALIZATION SUBROUTINE ***
14010 E$ =  CHR$ (27):D$ =  CHR$ (4):I$ =  CHR$ (9)
14020  DIM BYTE%(15,6)
14030  FOR X = 0 TO 15: FOR Y = 1 TO 6: READ BYTE%(X,Y): NEXT : NEXT
14040  DATA  127,127,127,127,127,127
14050  DATA  127,73,85,127,73,85
14060  DATA  127,85,85,127,85,85
14070  DATA  85,85,73,  85,85,73
14080  DATA  127,73,127,127,73,127
14090  DATA  85,0,0,85,0,0
14100  DATA  85,85,85,85,85,85
14110  DATA  127,0,0,127,0,0
14120  DATA  127,85,127,85,127,85
14130  DATA  85,73,85,73,85,73
14140  DATA  85,0,73,85,0,73
14150  DATA  73,0,0,73,0,0
14160  DATA  73,73,73,73,73,73
14170  DATA  85,0,85,0,85,0
14180  DATA  73,0,73,0,73,0
14190  DATA  0,0,0,0,0,0
14200  HOME : PRINT "HORIZONTAL SCALE 1 OR 2? ": GET RESPNSE$
14210  IF RESPNSE$ = "2" THEN HSCALE% = 2: GOTO 14230
14220 HSCALE% = 1
14230  PRINT : PRINT : PRINT "VERTICAL SCALE 1 OR 2? ": GET RESPNSE$
14240  IF RESPNSE$ = "2" THEN VSCALE% = 2: GOTO 14260
14250 VSCALE% = 1
14260  HOME
14270  RETURN
15000  REM   *** PRINT SUBROUTINE ***
15005  PRINT
15010  PRINT D$;"PR#1": REM     PRINTER ON
15020  PRINT I$;"80N": REM      SCREEN OFF
15030  PRINT  CHR$ (12);: REM  TOP OF FORM
15040  PRINT E$;"A"; CHR$ (7): REM SET LF TO 7/72 OF AN INCH & LF ONE LINE
15050  FOR Y = 0 TO 39
15055  FOR Z = 1 TO VSCALE%
15056  FOR S = 0 TO 3
15057 PTRN$ = ""
15060  FOR X = 0 TO 9
15070 W =  SCRN( ((S * 10) + X),Y)
15080  FOR V = 1 TO HSCALE%
15090  FOR U = 1 TO 6
15200 PTRN$ = PTRN$ +  CHR$ (BYTE%(W,U))
15210  NEXT U
15220  NEXT V
15230  NEXT X
15240  PRINT E$;"K"; CHR$ (60 * HSCALE%); CHR$ (0);: REM    SIGNAL PRINTER
       THAT A GRAPHICS STRING IS COMING
15250  PRINT PTRN$;
15260  NEXT S
15270  PRINT ""
15280  NEXT Z
15290  NEXT Y
15300  PRINT  CHR$ (12): REM     TOP OF FORM
15310  PRINT E$;"@": REM         RESET PRINTER
15320  PRINT I$;"I": REM         SCREEN ON
15330  PRINT D$;"PR#0": REM      PRINTER OFF
15340  RETURN
```

OKIDATA

Making small printers for people who think big.

OKIGRAPH™
Dot Addressable Graphics Prints Circles Around The Competition

Or squares. Or charts. Or graphs. Or illustrations. Or any graphic data your computer tells it to print. All with superb clarity and resolution.

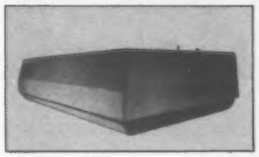
OKIGRAPH™ is standard equipment on the Microline 84 and the Model 2350. It's an easily added option to the Microline 82A and 83A. So don't settle for the plain old text you get with other printers. Be creative. With Okigraph.

Interested? Contact us at 111 Gaither Drive, Mount Laurel, N.J. 08054, or call (800) 257-7768 for the name of your local authorized Okidata distributor.

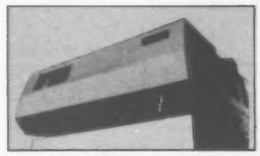
Okidata is a subsidiary of
Oki Electric Industry Company Ltd.

*Apple™ is a trademark of
Apple Computer Inc.

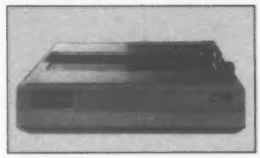
- OKIGRAPH™ I includes two plug-in PROMs and an instruction manual with the assembly language programming needed to create Apple™ compatible software.
- OKIGRAPH™ II includes a floppy disk for additional graphics printing features and an instruction manual.



Microline 82A

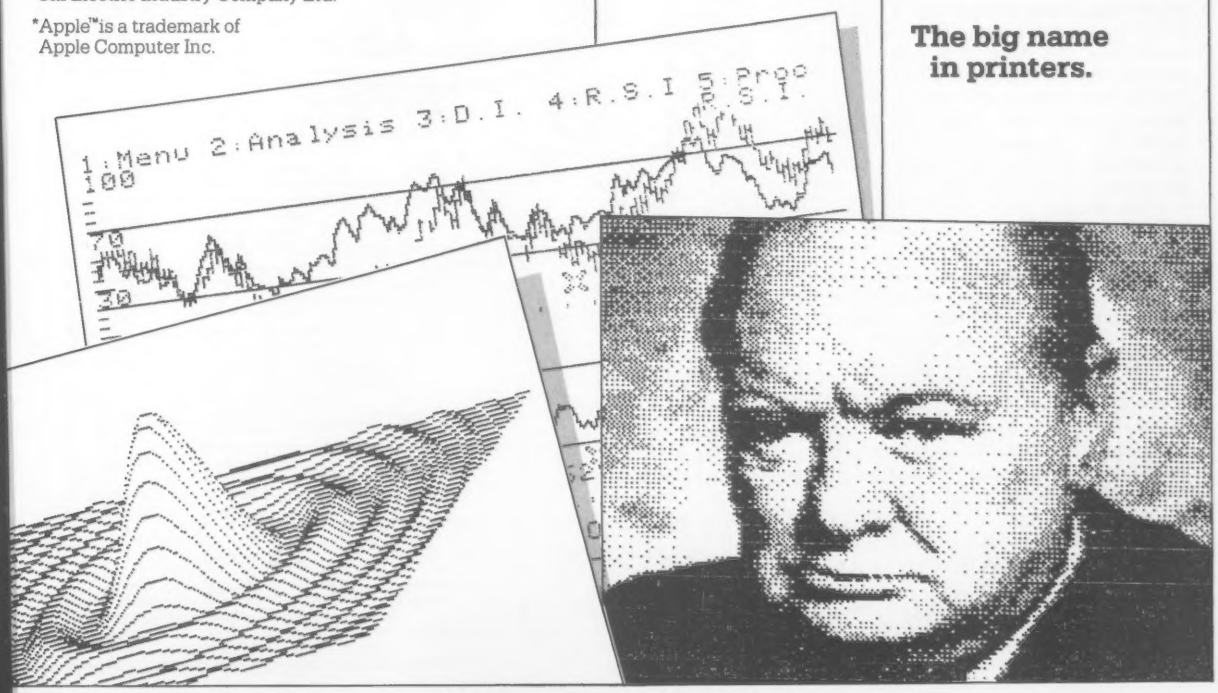


Microline 83A



Microline 84

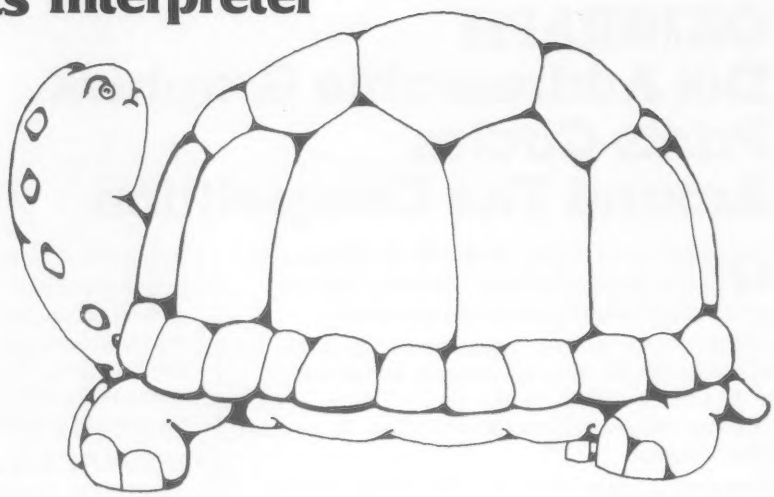
The big name in printers.



CIRCLE 196 ON READER SERVICE CARD

HTURTLE

A Turtlegraphics Interpreter in Applesoft



Al Evans

"Quick — give me a Basic routine to draw a polygon with any number of sides anywhere on the screen," challenged my "famous artist" friend Jim Gabour.

Shades of high school trigonometry. I thought fast — well, medium fast.

The Apple II has marvelous graphics capabilities. The problem is that to plot a point, you must know its X and Y coordinates. To draw a hexagon, for example, you must know which six points to draw lines between. And unless you are more intimate with simple geometric figures than I am, finding the coordinates of those six points can be occasion for a great deal of head scratching.

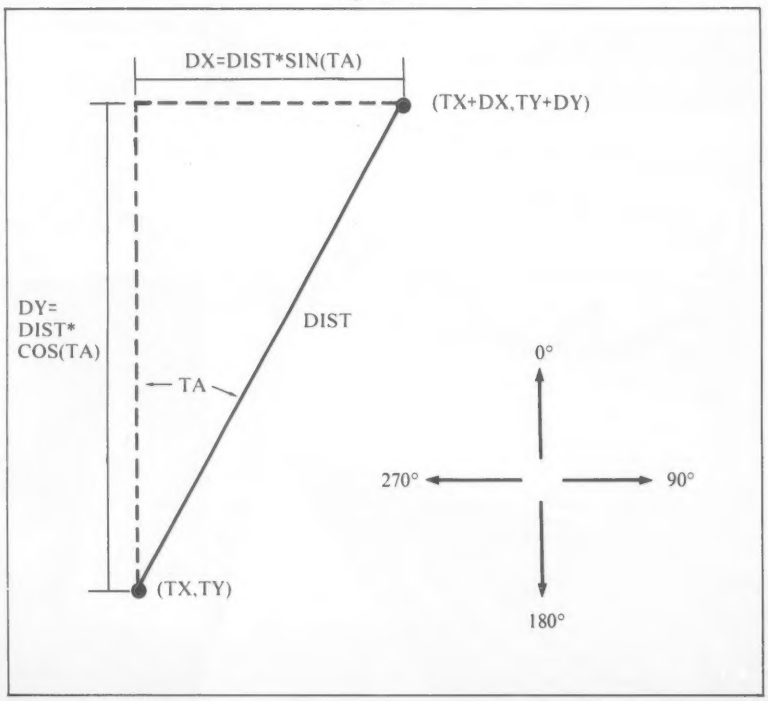
Enter the ideas of Dr. Seymour Papert of MIT the "inventor" of the computer language Logo and, specifically, of Turtlegraphics. "Why not," says Dr. Papert, "have a small beastie somewhere on the screen — call it a turtle — which knows where it is and what direction it's facing, and is capable of moving, turning, and drawing lines with its tail?"

Hmmm . . . in that case, if N were the number of polygon sides to be drawn and DIST were the length of each side, we could simply tell the turtle TURN(360/N): MOVE(DIST) N times, and there's our polygon.

But how do we get that turtle into the Apple without springing for Pascal and a language card?

Al Evans, 1206 Karen Ave., Austin, TX 78757.

Figure 1.



H&E COMPUTRONICS INC.

• EVERYTHING FOR YOUR TRS-80* • ATARI* • APPLE* • PET* •

*TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. - *ATARI is a trademark of Atari Inc. - *Apple is a trademark of Apple Corp. - *Pet is a trademark of Commodore

BUSINESS PAC 100

100 Ready-To-Run Business Programs

★ All orders processed within 24-Hours
★ 30-Day money back guarantee on all Software (less a $3 penalty for handling)

(ON CASSETTE OR DISKETTE).....Includes 110 Page Users Manual.....5 Cassettes (Or Diskettes)
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....

BUSINESS 100 PROGRAM LIST

1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNU1	Annuity computation program
3	DATE	Time between dates
4	DAYYEAR	Day of year a particular date falls on
5	LEASEINT	Interest rate on lease
6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs. depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
19	EFFECT	Effective interest rate of a loan
20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
23	REGWITH	Equal withdrawals from investment to leave 0 over
24	SIMPDISK	Simple discount analysis
25	DATEVAL	Equivalent & nonequivalent dated values for oblig.
26	ANNUDEF	Present value of deferred annuities
27	MARKUP	% Markup analysis for items
28	SINKFUND	Sinking fund amortization program
29	BONDVAL	Value of a bond
30	DEPLETE	Depletion analysis
31	BLACKSH	Black Scholes options analysis
32	STOCVAL1	Expected return on stock via discounts dividends
33	WARVAL	Value of a warrant
34	BONDVAL2	Value of a bond
35	EPSEST	Estimate of future earnings per share for company
36	BETAALPH	Computes alpha and beta variables for stock
37	SHARPE1	Portfolio selection model-i.e. what stocks to hold
38	OPTWRITE	Option writing computations
39	RTVAL	Value of a right
40	EXPVAL	Expected value analysis
41	BAYES	Bayesian decisions
42	VALPRINF	Value of perfect information
43	VALADINF	Value of additional information
44	UTILITY	Derives utility function
45	SIMPLEX	Linear programming solution by simplex method
46	TRANS	Transportation method for linear programming
47	EOQ	Economic order quantity inventory model
48	QUEUE1	Single server queueing (waiting line) model
49	CVP	Cost-volume-profit analysis
50	CONDPROF	Conditional profit tables
51	OPTLOSS	Opportunity loss tables
52	FQUOQ	Fixed quantity economic order quantity model
NAME		**DESCRIPTION**
53	FQEOWSH	As above but with shortages permitted
54	FQEOQPB	As above but with quantity price breaks
55	QUEUECB	Cost-benefit waiting line analysis
56	NCFANAL	Net cash-flow analysis for simple investment
57	PROFIND	Profitability index of a project
58	CAP1	Cap. Asset Pr. Model analysis of project
59	WACC	Weighted average cost of capital
60	COMPBAL	True rate on loan with compensating bal. required
61	DISCBAL	True rate on discounted loan
62	MERGANAL	Merger analysis computations
63	FINRAT	Financial ratios for a firm
64	NPV	Net present value of project
65	PRINDLAS	Laspeyres price index
66	PRINDPA	Paasche price index
67	SEASIND	Constructs seasonal quantity indices for company
68	TIMETR	Time series analysis linear trend
69	TIMEMOV	Time series analysis moving average trend
70	FUPRINF	Future price estimation with inflation
71	MAILPAC	Mailing list system
72	LETWRT	Letter writing system-links with MAILPAC
73	SORT3	Sorts list of names
74	LABEL1	Shipping label maker
75	LABEL2	Name label maker
76	BUSBUD	DOME business bookkeeping system
77	TIMECLCK	Computes weeks total hours from timeclock info.
78	ACCTPAY	In memory accounts payable system-storage permitted
79	INVOICE	Generate invoice on screen and print on printer
80	INVENT2	In memory inventory control system
81	TELDIR	Computerized telephone directory
82	TIMUSAN	Time use analysis
83	ASSIGN	Use of assignment algorithm for optimal job assign.
84	ACCTREC	In memory accounts receivable system-storage ok
85	TERMSPAY	Compares 3 methods of repayment of loans
86	PAYNET	Computes gross pay required for given net
87	SELLPR	Computes selling price for given after tax amount
88	ARBCOMP	Arbitrage computations
89	DEPRSF	Sinking fund depreciation
90	UPSZONE	Finds UPS zones from zip code
91	ENVELOPE	Types envelope including return address
92	AUTOEXP	Automobile expense analysis
93	INSFILE	Insurance policy file
94	PAYROLL2	In memory payroll system
95	DILANAL	Dilution analysis
96	LOANAFFD	Loan amount a borrower can afford
97	RENTPRCH	Purchase price for rental property
98	SALELEAS	Sale-leaseback analysis
99	RRCONVBD	Investor's rate of return on convertable bond
100	PORTVAL9	Stock market portfolio storage-valuation program

☐ **CASSETTE VERSION** **$99.95**
☐ **DISKETTE VERSION** **$99.95**
☐ **TRS-80* MODEL II VERSION** **$149.95**

ADD $2.00 FOR SHIPPING IN UPS AREAS
ADD $3.00 FOR C.O.D. OR NON-UPS AREAS
ADD $4.00 OUTSIDE U.S.A, CANADA & MEXICO

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

VISA

24 HOUR ORDER LINE
(914) 425-1535

CIRCLE 136 ON READER SERVICE CARD

Hazy memories of twelfth grade math and a frantic search of available references led to Figure 1.

In this figure, TX and TY are the turtle's present X and Y coordinates. TA is the turtle's present angle with respect to the vertical, and DIST is the distance we want it to move. If DX is the distance the turtle will move on the X axis and DY the distance on the Y axis, the other end of the line it will draw is (TX+DX,TY+DY). So we need to compute DX and DY.

Straight from the moldy old trig text comes the answer: DX = DIST * SIN(TA) and DY = DIST * COS(TA). Pretty simple, huh?

Pop quiz: what happens to the formulas if we turn the picture 90° so that 0° faces due east, as is the case in Apple Pascal Turtlegraphics?

If you answered "Why, the X and Y axes are interchanged, so that now DX = COS(TA) and DY = SIN(TA)" without actually turning the picture sideways,

How do we get that turtle into the Apple without springing for Pascal and a language card?

you're a lot better at visualization than I am. Go to the head of the class.

Let's play with the turtle a bit, then come back to the question of polygons.

Listing 1 is HTURTLE, an interactive Turtlegraphics emulator written in Applesoft Basic. It works like the Turtlegraphics unit used in Apple Pascal, except that 0° is due north and angles increase in a clockwise direction (points of personal preference). In addition, the maximum Y value is 159 (to leave room for text at the bottom).

The turtle understands the following commands:

INITTURTLE: Clears the screen to black and places the turtle in the center, heading north (0°).

PENCOLOR(COLOR): Tells the turtle what color of electrons to fill its tail with. The possible values are NONE, BLACK, GREEN, BLUE, WHITE, ORANGE, and VIOLET.

TURN(ANGLE): Tells the turtle to turn ANGLE degrees. Positive values are clockwise, negative values counterclockwise.

TURNTO(ANGLE): The turtle turns to face in the direction ANGLE.

Listing 1.

```
10  REM  "HTURTLE"
11  REM  TURTLEGRAPHICS
12  REM  APPLESOFT INTERPRETER
13  REM  COPYRIGHT 1981 BY
14  REM  AL EVANS
49 :
50  LOMEM: 16384
55  GOSUB 10000: REM   INITIALIZE
56 :
100  REM  MAIN LOOP AND
101  REM  COMMAND PARSER
110 IN$ = "":CMD$ = "":PAR$ = "": PRINT ":";
115  GET CH$: IF CH$ =  CHR$ (13) THEN 145
120  IF CH$ <  > CHR$ (8) THEN 140
125  IF  LEN (IN$) = 0 THEN 115
130  IF  LEN (IN$) = 1 THEN IN$ = "": POKE 36, PEEK (36) - 1: GOTO 115
135 IN$ =  LEFT$ (IN$, LEN (IN$) - 1): POKE 36, PEEK (36) - 1: GOTO 115
140  PRINT CH$;:IN$ = IN$ + CH$: GOTO 115
141 :
145  PRINT : FOR I = 1 TO  LEN (IN$)
150  IF  MID$ (IN$,I,1) = "(" THEN CMD$ =  MID$ (IN$,1,I - 1):PAR$ =  MID$
     (IN$,I + 1):I = 0: GOTO 200
155  NEXT I
160 CMD$ = IN$
198 :
199  REM  COMPARE TO CMD$ LIST
200  FOR I = 1 TO NC
205  IF CMD$ = CMD$(I) THEN CASE = I:I = 0: GOTO 300
210  NEXT I
220  INVERSE : PRINT "DO NOT UNDERSTAND": NORMAL : GOTO 110
299 :
300  REM  SELECT SUBROUTINE
301  REM  THEN LOOP BACK
305  ON CASE GOSUB 1000,1500,2000,2500,3000,3500,4000,4500,5000,5500: REM
     "CASE SELECTOR"
310  GOTO 110
311 :
1000  REM  INITTURTLE
1005 TX = 140:TY = 80:TA = 0:DF = 0
1010  POKE 34,20: HOME : HGR
1015  RETURN
1499 :
1500  REM  PENCOLOR
1505  FOR I = 1 TO  LEN (PAR$)
1510  IF  MID$ (PAR$,I,1) = ")" THEN PAR$ =  MID$ (PAR$,1,I - 1):I = 0:
      GOTO 1520
1515  NEXT I
1520  IF PAR$ = "NONE" THEN DF = 0: RETURN
1525  FOR I = 1 TO 6
1530  IF PAR$ = CLR$(I,1) THEN CLR =  VAL (CLR$(I,2)):I = 0: GOTO 1545
1535  NEXT
1540  INVERSE : PRINT "NO SUCH COLOR": NORMAL : RETURN
1545  HCOLOR= CLR:DF = 1
1550  RETURN
1999 :
2000  REM  TURN
2005 TA = TA + CF *  VAL (PAR$)
2010  IF TA < 0 THEN TA = TA + TWOPI: GOTO 2010
2015  IF TA >  = TWOPI THEN TA = TA - TWOPI: GOTO 2015
2025  RETURN
2499 :
2500  REM  TURNTO
2505 TA = CF *  VAL (PAR$)
2510  IF TA < 0 THEN TA = TA + TWOPI: GOTO 2510
2515  IF TA >  = TWOPI THEN TA = TA - TWOPI: GOTO 2515
2525  RETURN
2999 :
3000  REM  MOVE
3005 DIST =  VAL (PAR$):OX = TX:OY = TY
3010 DX = DIST *  SIN (TA):DY = DIST *  COS (TA)
3015 TX = OX + DX:TY = OY + DY
3020  IF TX > 279 OR TX < 0 OR TY > 159 OR TY < 0 THEN TX = OX:TY = OY:
      INVERSE : PRINT "OFF SCREEN": NORMAL : RETURN
3025  REM  FLIP Y COORDINATE
3030  REM  AND DRAW LINE
3035  IF DF THEN  HPLOT OX,159 - OY TO TX,159 - TY
3040  RETURN
3499 :
3500  REM  MOVETO
3502 OX = TX:OY = TY
```

Tired Of Your GENERAL LEDGER?

VERSA-LEDGER

★ THE ULTIMATE PERSONAL CHECK REGISTER
★ A PROFESSIONAL ACCOUNTING SYSTEM
★ A PERSONAL FINANCIAL MANAGER
★ A SMALL BUSINESS ACCOUNTING SYSTEM
★ A COMPLETE GENERAL LEDGER

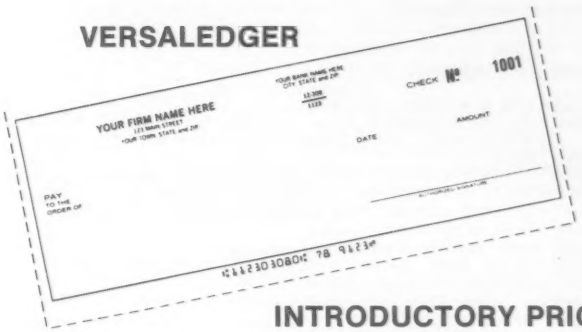
FOR YOUR TRS-80 MODEL I, II , III or COLOR COMPUTER • APPLE II • I.B.M. • XEROX • ATARI
ALL MICROSOFT BASIC COMPUTERS

HOW IT WORKS . . . .

VERSALEDGER is a complete accounting system that grows as you or your business grows. To start, your VERSALEDGER acts as a simple method of keeping track of your checkbook. Just enter your check number, date and to whom the check is made out to. As you or your business grows, you may add more details to your transactions . . . . account number, detailed account explanations, etc.

- VERSALEDGER can give you an instant cash balance at anytime. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used as a small personal checkbook register. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used to run your million dollar corporation. **(IF YOU WANT IT TO)**
- VERSALEDGER prints checks. **(IF YOU WANT IT TO)**
- VERSALEDGER stores all check information forever. **(IF YOU WANT IT TO)**
- VERSALEDGER can handle more than one checkbook. **(IF YOU WANT IT TO)**
- VERSALEDGER can be used to replace a general ledger. **(IF YOU WANT IT TO)**

VERSALEDGER



INTRODUCTORY PRICE
$99.95

- VERSALEDGER HAS AN ALMOST UNLIMITED CAPACITY . . . .
  (300 checks per month on single density 5¼" disk drives such as the TRS-80 Model-I)
  (500 checks per month on the Apple II)
  (2400 checks per month on the TRS-80 Model III)
  (6000 checks per month on the TRS-80 Model II)
  (3000 checks per month on single density 8" CP/M)
- VERSALEDGER will soon have an add-on payroll package. **(IF YOU NEED IT)**

— CAN BE USED WITH 1 or MORE DISK DRIVES —

VERSALEDGER HAS BEEN CREATED WITH THE FIRST TIME COMPUTER USER IN MIND

COMPUTRONICS INC
MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

★ ADD $3.00 FOR SHIPPING IN UPS AREAS
★ ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
★ ADD $5.00 TO CANADA AND MEXICO
★ ADD PROPER POSTAGE OUTSIDE U.S., CANADA & MEXICO

master charge · VISA · AMERICAN EXPRESS

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

*** ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE ***

CIRCLE 137 ON READER SERVICE CARD

MOVE(DISTANCE): The turtle moves DISTANCE units in the direction it is presently facing. If PENCOLOR is anything other than NONE, it draws a line in PENCOLOR.

MOVETO(X,Y): The turtle moves to screen coordinates X,Y. If PENCOLOR is anything other than NONE, it draws a line in PENCOLOR.

TURTLEX: Reports the turtle's present X position.

TURTLEY: Reports the turtle's present Y position.

TURTLEANG: Reports the turtle's present direction.

QUIT: Switches the computer back to text, resets the normal text window, homes the cursor, and ENDs the program.

Order the turtle about by typing in commands and parameters in the format shown above. The closing parenthesis may be omitted. The turtle's "box" is 280 x 160 screen units, with point 0,0 in the lower left-hand corner.

Now back to the original problem: to draw an N-sided polygon anywhere on the screen. The aforementioned trig text only had the one illustration (I went to a cheap high school), so I played with it a bit and came up with Figure 2.

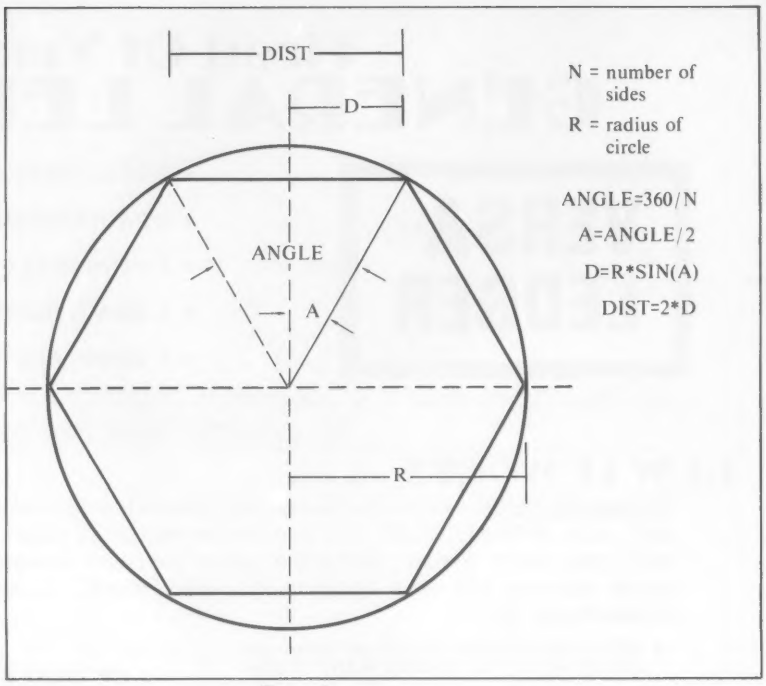


Figure 2.

Listing 1, continued...

```
3505  FOR I = 1 TO  LEN (PAR$)
3510  IF  MID$ (PAR$,I,1) = "," THEN TX =  VAL ( MID$ (PAR$,1,I - 1))
      :TY = VAL ( MID$ (PAR$,I + 1)):I = 0: GOTO 3530
3515  NEXT I
3520  INVERSE : PRINT "NEED TWO NUMBERS": NORMAL : RETURN
3530  IF TX > 279 OR TX < 0 OR TY > 159 OR TY < 0 THEN TX = OX:TY = OY:
      INVERSE : PRINT "OFF SCREEN": NORMAL : RETURN
3531  REM  FLIP Y COORDINATE
3532  REM  AND DRAW LINE
3535  IF DF THEN  HPLOT OX,159 - OY TO TX,159 - TY
3540  RETURN
3999 :
4000  REM  TURTLEX
4002 TX =  INT (TX + .5)
4005  INVERSE : PRINT "TURTLEX = ";TX: NORMAL
4010  RETURN
4499 :
4500  REM  TURTLEY
4502 TY =  INT (TY + .5)
4505  INVERSE : PRINT "TURTLEY = ";TY: NORMAL
4510  RETURN
4999 :
5000  REM  TURTLEANG
5005  INVERSE : PRINT "TURTLEANG = "; INT (TA / CF + .5): NORMAL
5010  RETURN
5499 :
5500  REM  QUIT
5510  POKE 34,0: TEXT : HOME : END
5999 :
10000  REM  INITIALIZATION
10005  DIM CMD$(20):CF = .0174533:TWOPI = 6.2831853
10010  READ NC: FOR I = 1 TO NC: READ CMD$(I): NEXT
10020  FOR I = 1 TO 6: READ CLR$(I,1): READ CLR$(I,2): NEXT
10030  GOSUB 1000: REM  INITTURTLE
10040  FLASH : PRINT "YOUR TURTLE IS READY": NORMAL
10100  RETURN
10999 :
11000  REM  COMMANDS PRESENTLY
11001  REM  IMPLEMENTED
11100  DATA  10: REM  NC - NUMBER  OF COMMANDS
11105  DATA  INITTURTLE,PENCOLOR
11110  DATA  TURN,TURNTO,MOVE,MOVETO
11115  DATA  TURTLEX,TURTLEY,TURTLEANG
11120  DATA  QUIT
11200  REM  COLORS
11300  DATA  BLACK,0,GREEN,1,BLUE,2,WHITE,3,ORANGE,5,VIOLET,6
```

Obviously, if we inscribe the N-sided polygon inside a circle, the circle will be divided into N equal "pie slices," and the included angle for each slide (ANGLE) will be 360/N. In addition, the turtle will have to turn N times, so the angle of each turn will also be 360/N.

If we divide one of the slices in half vertically, we have the triangle shown in Figure 1 once again. The included angle is now A = ANGLE/2. Using the same formula as in Figure 1, we have D = R * SIN(A). And 2 * D is the distance the turtle should move after each turn.

So now we can draw a polygon with any number of sides anywhere on the screen, given the number of sides N and the radius R. Listing 2 is POLYGON, a short program which demonstrates this fact.

Lines 60000-60020 and 61000-61020 in POLYGON are "extracts" of the MOVE and TURN subroutines in HTURTLE, and are obviously intended to be "detached" for use in your own programs.

How the Programs Work

HTURTLE has three main parts: the initialization section, the command parser, and the working subroutines.

The initialization routine (lines 10000-11300) first makes room for a list of commands (CMD$(1 to 20)) and sets values for CF, a degree-to-radian conversion factor, and TWOPI, the number of radians in a circle. The next two lines read the number of commands available, the name of each command, the names of the colors available, and the "HCOLOR"

A REMARKABLE MAGAZINE

David Ahl, Founder and
Publisher of Creative Computing

creative computing

"The beat covered by Creative Computing is one of the most important, explosive and fast-changing."—Alvin Toffler

You might think the term "creative computing" is a contradiction. How can something as precise and logical as electronic computing possibly be creative? We think it can be. Consider the way computers are being used to create special effects in movies—image generation, coloring and computer-driven cameras and props. Or an electronic "sketchpad" for your home computer that adds animation, coloring and shading at your direction. How about a computer simulation of an invasion of killer bees with you trying to find a way of keeping them under control?

Beyond Our Dreams

Computers are not creative per se. But the way in which they are used can be highly creative and imaginative. Five years ago when *Creative Computing* magazine first billed itself as "The number 1 magazine of computer applications and software," we had no idea how far that idea would take us. Today, these applications are becoming so broad, so all-encompassing that the computer field will soon include virtually everything!

In light of this generality, we take "application" to mean whatever can be done with computers, *ought* to be done with computers or *might* be done with computers. That is the meat of *Creative Computing*.

Alvin Toffler, author of *Future Shock* and *The Third Wave* says, "I read *Creative Computing* not only for information about how to make the most of my own equipment but to keep an eye on how the whole field is emerging.

Creative Computing, the company as well as the magazine, is uniquely lighthearted but also seriously interested in all aspects of computing. Ours is the magazine of software, graphics, games and simulations for beginners and relaxing professionals. We try to present the new and important ideas of the field in a way that a 14-year old or a Cobol programmer can understand them. Things like text editing, social simulations, control of household devices, animation and graphics, and communications networks.

Understandable Yet Challenging

As the premier magazine for beginners, it is our solemn responsibility to make what we publish comprehensible to the newcomer. That does not mean easy; our readers like to be challenged. It means providing the reader who has no preparation with every possible means to seize the subject matter and make it his own.

However, we don't want the experts in our audience to be bored. So we try to publish articles of interest to beginners and experts at the same time. Ideally, we would like every piece to have instructional or informative content—and some depth—even when communicated humorously or playfully. Thus, our favorite kind of piece is acessible to the beginner, theoretically non-trivial, interesting on more than one level, and perhaps even humorous.

David Gerrold of *Star Trek* fame says, "*Creative Computing* with its unpretentious, down-to-earth lucidity encourages the computer user to have fun. *Creative Computing* makes it possible for me to learn basic programming skills and use the computer better than any other source.

Hard-hitting Evaluations

At *Creative Computing* we obtain new computer systems, peripherals, and software as soon as they are announced. We put them through their paces in our Software Development Center and also in the environment for which they are intended—home, business, laboratory, or school.

Our evaluations are unbiased and accurate. We compared word processing printers and found two losers among highly promoted makes. Conversely, we found one computer had far more than its advertised capability. Of 16 educational packages, only seven offered solid learning value.

When we say unbiased reviews we mean it. More than once, our honesty has cost us an advertiser—temporarily. But we feel that our first obligation is to our readers and that editorial excellence and integrity are our highest goals.

Karl Zinn at the University of Michigan feels we are meeting these goals when he writes. "*Creative Computing* consistently provides value in articles, product reviews and systems comparisons . . . in a magazine that is fun to read."

Order Today

When you order an introductory subscription to *Creative Computing*, you'll save as much as 33%. One year (12 issues) costs $19.97—20% off. Two years go for $36.97, or 26% off. And three years cost $49.97—a 33% saving. All savings are based on the full one-year subscription price of $24.97.

Foreign orders: Add $5 a year for Canada. Add $10 a year (cash payment in U.S. currency only) for all other countries outside U.S. and possessions.

Please allow 30 to 60 days for delivery of your first issue. We guarantee your complete satisfaction or we will refund the full amount for all the unmailed issues remaining in your subscription.

To order, make your check payable to *Creative Computing* and mail it to the address below—*today!*

creative computing

P.O. Box 5214
Boulder, Colorado 80322

CIRCLE 261 ON READER SERVICE CARD

HTURTLE, continued...

Listing 2.

```
10  REM  "POLYGON"
11  REM  MOVE & TURN SUBROUTINES,
12  REM  POLYGON ROUTINE
13  REM  BY AL EVANS, 1980
14 :
15 CF = .0174533:TWOPI = 6.2831853: REM  CONSTANTS
20 TX = 0:TY = 0:TA = 0:DX = 0:DY = 0:OX = 0:OY = 0: REM TURTLE'S VARIABLE
    S
25 DIST = 0:ANGLE = 0: REM  PARAMETERS
26 :
100  REM  CONTROL LOOP
105  HGR : HCOLOR= 3: POKE 34,20: HOME
110  INPUT "CENTER OF POLYGON (X,Y): ";CX,CY
115  INPUT "RADIUS OF POLYGON: ";R
120  IF CX + R > 279 OR CX - R < 0 OR CY + R > 159 OR CY - R < 0 THEN
     INVERSE : PRINT "TOO BIG": NORMAL : GOTO 115
125  INPUT "NUMBER OF SIDES: ";N
130  GOSUB 1000
135  GOTO 110
136 :
1000  REM  POLYGON
1005  HPLOT CX,CY: REM  MARK CENTER
1010 ANGLE = 360 / N:A = ANGLE / 2
1015 DIST = 2 * (R *  SIN (A * CF))
1020 TX = CX + R *  SIN (A * CF):TY = 159 - CY + R *  COS (A * CF):TA = 90
     * CF: REM  START AT TOP RIGHT, FACING EAST
1025  FOR I = 1 TO N
1030  GOSUB 61000: GOSUB 60000
1035  NEXT I
1040  RETURN
1041 :
60000  REM  MOVE
60005 DX = DIST *  SIN (TA):DY = DIST *  COS (TA):OX = TX:OY = TY
60010 TX = OX + DX:TY = OY + DY
60015  HPLOT OX,159 - OY TO TX,159 - TY
60020  RETURN
61000  REM  TURN
61005 TA = TA + CF * ANGLE
61010  IF TA < 0 THEN TA = TA + TWOPI: GOTO 61010
61015  IF TA >  = TWOPI THEN TA = TA - TWOPI: GOTO 61015
61020  RETURN
```

number for each color from the data list in lines 11000-11300. The routine then initializes the turtle, prints a "hello" message, and RETURNs. Control passes to the command parser, the "main loop" of this program.

The command parser (lines 100-310) has the job of getting a command from the keyboard character-by-character, separating it into its command (CMD$) and parameter (PAR$) parts, and comparing the command to the list of defined actions. If the command entered is not on the list, an error message is displayed and the program loops back to get another command. If the command is valid, the appropriate subroutine is selected in line 305.

Note that this command parser simply passes all input following the command to the working subroutine as a string of characters. Each subroutine is smart enough to figure out whether it has the information it needs.

The design of the initialization routine and command parser make it easy to add new commands. Simply change NC in line 11100, add the new commands at the end of the data list (line 11020), and add the line numbers on which the new subroutines begin to the list of "cases" in line 305.

The working subroutines begin at line 1000.

INITTURTLE (lines 1000-1015) places the turtle in the middle of the screen heading north, clears the screen to HI-RES page 1, and homes the cursor to the top of the text window. DF (draw flag) is a logical variable which controls whether any plotting actually takes place. It is set to 0 by INITTURTLE so that nothing will be drawn on the screen (PENCOLOR will be NONE).

The last time I saw him he was negotiating with a room full of turtles and an ink manufacturer for "exclusive representation rights."

PENCOLOR (lines 1500-1550) removes the final parenthesis (if any) from the parameter it receives and sets DF to 0 if the parameter is NONE. Otherwise, it checks PAR$ against the list of colors. If a match is not found, it issues an error message and RETURNs. If the parameter is a defined color, it sets HCOLOR to the appropriate value and sets DF to 1 so that plotting can take place.

TURN (lines 2000-2025) adds VAL(PAR$) * CF radians to the turtle angle (TA), then adds or subtracts as many complete circles (TWOPI) as necessary to keep the final angle between 0 and 360 degrees. Note that no parsing is necessary in this subroutine — if PAR$ cannot be interpreted as a number, its VALue is 0, and the subroutine will do nothing.

TURNTO (lines 2500-2525) works identically, except that the old value of TA is simply replaced with the new one.

MOVE (lines 3000-3040) uses the formulas given above to calculate the X and Y components (DX and DY) of the vector DIST. These components are added to TX and TY to determine the new screen position of the turtle. If the new position is not within the graphics window, an error message is displayed and the old position is restored. If the new position is on the screen and the draw flag is set, the line is drawn.

MOVETO (lines 3500-3535) looks through the PAR$ passed to it for a comma. If it doesn't find one, it issues an error message and RETURNs to the main loop. If PAR$ contains a comma, everything numeric before the comma is used as a new TX value and everything of VALue after it as a new TY value. If the new coordinates are off the screen, an error message is displayed and the old position is restored. If the new position is on the screen and DF is set, the line is drawn.

TURTLEX, TURTLEY, and TURTLEANG (lines 4000-5010) display the turtle's present X position, Y position, and angle. The X and Y coordinates are rounded to integers; the angle is converted back from radians to degrees and rounded to the nearest degree.

The POLYGON program is very simple. The constants, variables, and parameters used by the turtle are initialized in lines 15-25. Lines 100-135 control the program.

The POLYGON routine in lines 1000-1040 uses the techniques developed earlier to draw an N-sided polygon with a radius of R centered at CX,CY. ANGLE and DIST are calculated in lines 1015-1020 using the formulas of Figure 2. The starting position is calculated in line 1025. Then lines 1030-1040 draw the polygon using the MOVE and DRAW subroutines.

These subroutines can be extracted (by DELeting lines 10 to 1046) and used in any program. Note that DRAW does no error-checking; make sure your program doesn't call on it to draw a line off the screen. The value 159 in line 60015 can be changed to 191 for full-screen plotting. Or the line can be changed to HPLOT OX,OY TO TX,TY to use the normal Apple coordinate system with 0,0 at the upper left.

"Eureka!" cried Jim, "it actually works!" He ran off muttering something about squaring the circle, and the last time I saw him he was negotiating with a room full of turtles and an ink manufacturer for "exclusive representation rights." □

NEECO

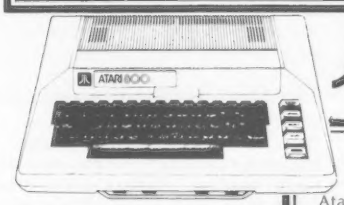
Commodore Computer

VIC 20 Personal Computer	$ 299.95
VIC 1515 Graphic Printer	$ 395.00
CBM 4016	$ 995.00
CBM 4032	$1295.00
CBM 8032	$1495.00
CBM SuperPet 9000	$1995.00
CBM 8050 Dual Disk Drive	$1795.00
CBM 4040 Dual Disk Drive	$1295.00
CBM 2031 Single Disk Drive	$ 695.00
CBM 4022 Tractor Printer	$ 795.00
CBM 8010 IEEE Modem	$ 279.00
CBM Datasette	$ 74.95
CBM-IEEE Interface Cable	$ 39.95
IEEE-IEEE Interface Cable	$ 49.95

Professional Software/ for CBM Computers

WordPro™ — a Family of CBM Word Processing Programs

WordPro 2 Plus	$ 199.95
WordPro 3 Plus	$ 295.00
WordPro 4 Plus	$ 450.00
WordPro 5 Plus (for CBM 8096)	$ 450.00
The Administrator (DataBase for CBM)	$ 650.00
Power™ (Programmer's Utility ROM)	$ 89.95
InfoPro™ (DataBase for CBM)	$ 295.00



Atari

Atari 400 16K	$ 399.00
Atari 800 16K (incl. BASIC cartridge)	$ 899.00
Atari 410 Recorder	$ 99.95
Atari 810 Disk Drive	$ 599.95
Atari 822 Thermal Printer	$ 299.95

Amdek Monitors

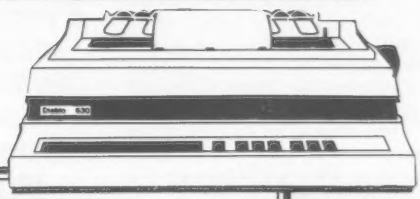
Video 100G	$ 179.00
Video 300G	$ 200.00
Color 1	$ 449.00
Color 2	$ 999.00

Qume

Sprint 9/45	$2495.00
Tractor Option	$ 210.00

CMD Mupet

MC-800A Mupet Controller (Multi-User Controller for CBM Computers)	$ 995.00
CM-100 Channel Module	$ 250.00
Printer Module	$ 350.00



Epson Printers

MX-70	$ 299.95
MX-80 w/Graphtrax	$ 645.00
MX-80 FT	$ 745.00
MX-100 FT	$ 945.00
INTERFACE CARDS	
8141 RS-232 Interface Board	$ 75.00
8145 RS-232 Interface Board w/2K Buffer	$ 149.00
8151 RS-232 Interface Board w/X/ON-X/OFF	$ 170.00
8161 IEEE Interface Board	$ 55.00
8131 Apple Interface Card	$ 85.00
8232 Apple Interface Cable	$ 35.00
8220 TRS-80 Cable	$ 35.00

Diablo 630 Printer

Diablo 630	$2710.00
Tractor Option	$ 350.00

NEC Spinwriter Printer

NEC 7730	$3085.00
NEC 7710	$3085.00
NEC 7720	$3610.00
NEC 3510	$2290.00
NEC 3500RD	$1895.00

Tractor Feed Options are available

*WordPro, POWER, & InfoPro are registered trademarks of Professional Software Inc.

CALL FOR OUR 70 PAGE CATALOG FOR COMPLETE PRODUCT LINE AND PRICE LISTINGS.
WE WILL MATCH SOME ADVERTISED PRICES ON CERTAIN PRODUCTS LISTED UNDER SIMILAR "IN STOCK" CONDITIONS.

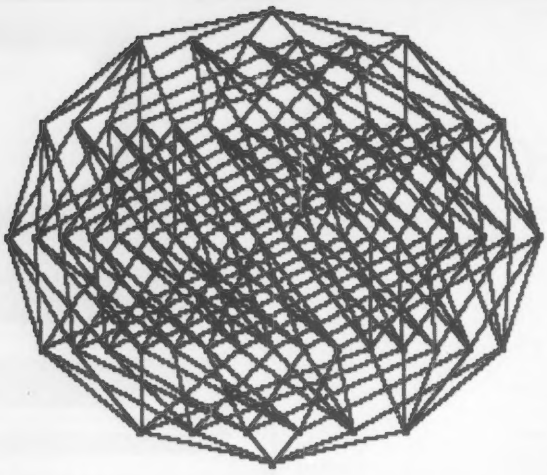
NEECO
679 Highland Ave.
Needham, MA 02194

(617) 449-1760
TELEX: 951021

MON-FRI 9:00 - 5:30 E.S.T.

MASTERCARD * VISA

CIRCLE 195 ON READER SERVICE CARD



Plotting N-Space Cubes

Dennis Clark

Every school child knows how to draw a square or a cube on a piece of paper. It is something we all learn at an early age. We can do it almost without thinking. But very few people can draw a picture of a tesseract (four-space cube) on a piece of paper.

For those people who know what a tesseract is, many would consider drawing one a rather pointless job. But there are a few strange individuals who are possibly science fiction buffs, or mathematicians or puzzle solvers who enjoy thinking about, and devising methods for drawing things like N-space cubes.

I do not claim to be a mathematician (I have trouble integrating e^x) but I do read a great deal of science fiction and I like to fiddle with puzzles.

Now it happens that N-space cubes are full of puzzling riddles, one of which is: How do you draw them on paper? Not many people could draw a four-space cube, but even fewer are able to draw a five- or six-space cube.

This article then, is dedicated to those puzzle solvers who wish to explore the mysteries of plotting N-space cubes on their home computers.

Although some of the characteristics of N-space cubes are perhaps hard to envision, many of their properties can be reduced to simple ideas that anyone can understand, and if I can understand how to draw them, you can too.

If you try to think of the fourth dimension as being time, and that dimension as being somehow tied together with a three-space cube you have already gone beyond my understanding of what a cube is, and have left me in the dust.

Dennis Clark, Route 2 Box 264, Paint Rock Ferry Road, Kingston, TN 37763

What I have to say about cubes has nothing to do with time travel or exiting from one side of a tesseract only to end up back inside of the thing. I won't discuss walking through a tesseract house watching yourself watch yourself walking through a tesseract house. What I am going to show you is how to draw a picture of an N-space cube on a two-dimensional surface.

Everything is aimed at magically obtaining order from the chaos of points which will appear as you create larger and larger N-space cubes.

Let's start out with an easy one. We'll start with a square. A square is really nothing more than a two-space cube. It is a two-dimensional cube. If we view a cube from one side, all we see is a square. This is easy to understand because we "took away" the third dimension of the cube, and are left with the square.

To draw a cube, all we need is two squares and four extra lines which connect each corner of one square to the same corner of the other square. Stated another way: a three-space cube can be made from two two-space cubes by drawing a line from each corner of one square to the same corner on the other square.

This can be generalized into the following rule: An (N+1)-space cube can be made from two N-space cubes by drawing a line from each corner of one N-space cube to the same corner on the other N-space cube.

Once you understand this rule, you can create any N-cube. For instance, to make a four-space cube just place two three-space cubes close together on a piece of paper, and draw a line between identical corners on each cube. Give it a try.

Drawing a Cube

Take a piece of paper right now, and draw two cubes, and then connect the top corners of each cube with a line segment, and the two bottom corners with a line segment, and the other six corners of each cube to their corresponding corners on the other cube. You will have created a four-space cube from two three-space cubes.

This method can be used to create any N-space cube from two (N-1)-space cubes. So if you wish, you could create a five-space cube by first drawing two four-space cubes close to each other, and then connecting each corner of one of the four-space cubes to its corresponding corner on the other four-space cube. Try it once you have drawn a four-space cube.

Of course, you may notice that the drawings you produce become a bit messy after a while. This comes from not knowing where to put the corners of the cubes so that they don't interfere with each other. We'll clean that up in a minute.

The important thing to understand is the very simple concept that any N-space cube is just made up of two (N-1)-space cubes, which are each made up of two (N-2)-space

cubes, etc. You can even extend the method on down to one-space and zero-space cubes.

A two-space cube (square) is made up of two one-space cubes (line segments) with two lines connecting the beginning point of the first line segment to the beginning point of the second line segment. And of course, the end point of the first line segment is connected to the end point of the second line segment.

A one-space cube is made from two zero-space cubes (points) with a single line drawn between those points. I thought I would include those last two examples for the mathematicians who feel insecure if the method doesn't work for all cases, but I personally refuse to consider anything less than a zero-space case.

For convenience, I would like to define a "point" as being any corner of a cube. A picture of a cube is really made up of nothing but line segments. The places where the line segments come together to form corners are really points, and it will be easier to refer to them as such from here on.

If you have followed these ideas up to this point, you are now capable of drawing any N-space cube on a piece of paper. If you wish to clean up the mess you would create by drawing them, read on. From here on, everything is aimed at magically obtaining order from the chaos of points which will appear as you create larger and larger N-space cubes.

For instance, each N-cube has $N*2^{(N-1)}$ line segments and 2^N points. If you draw an 11-space cube, your cube will have over 11,000 line segments, and over 2000 points, which gets very messy if you don't have logical places to put all of those points and lines. So, even though you can now make N-space cubes out of two (N-1)-space cubes, you need a better method which will tell you where to put all of the points of the cube.

Naming the Points

If you tried to create a four- or five-space cube by the methods outlined above, you are aware by now that it is sort of like trying to keep 16 or 32 children in line without knowing what their names are. So to keep order we have to name each of the points in any N-space cube.

Rather than call the points Johnny, Bruce, Dick, or Sally, it might be better if we use a mathematical model to name them. Let's really be original and name them 0, 1, 2, 3 . . . (2^N –1) where N is the dimension of the cube you are going to draw. Let's further say that the points will be labeled using binary numbers, not decimal numbers.

Why use binary numbers instead of decimal? Because they have the wonderful property of telling us which points should be close to each other. They solve the problem of keeping track of which point should be tied to which other points by line segments.

They tell us which points are "adjacent" to each other. They do this because in a three-space cube each point is adjacent to exactly three other points. A three-digit binary number can tell us which three points are adjacent to itself.

In a four-space cube, each point is adjacent to exactly four other points. A four-digit binary number can tell us which four points are adjacent to it.

In an N-space cube, each point is adjacent to exactly N other points. Another way of putting it is to say that three lines emanate from each corner in a three-space cube. Four lines radiate from each point in a four-space cube. These facts eventually lead us to a definition for points which are adjacent to each other.

Two points are said to be adjacent if the binary number "names" of those points differ by one and only one binary digit. "Adjacents" are those points which are adjacent to any given point.

This is the most important rule you must understand in order to create neatly structured N-space cubes. In fact, it is the only rule you need to understand how to create them. It is easy to think of an N-space cube being created out of two (N-1)-space cubes, but since the method creates messy cubes, it is only of value in understanding the structure of N-space cubes.

When you can determine which points are adjacent to each other, you will be able to make several different styles of any N-space cube which will (probably) look neat and orderly when you draw them. The rule will become clear when we try an example.

Connecting the Dots

Let's build a three-space cube by labeling its corners with binary numbers. Remember that two points which are adjacent are connected by a single line segment. Since we are working with a three-space cube, it will have 2^3 points.

It can be represented by the eight three-digit binary numbers 000 through 111. If we start by placing the point 000 on a piece of paper, we can readily see that its three adjacent points are those that differ from 000 by one digit only; namely, 001, 010, and 100.

Place the three adjacent points on an imaginary horizontal line below the point 000. Since 000 is adjacent to all three of the points, draw a line from 000 to each of the three adjacents. Now move down to the point 001 and find the three numbers which differ from it by one binary digit. They are the numbers 000 which we already have on the paper, 011, and 101. Computer programmers will recognize the process of finding numbers which differ by one digit as an exclusive "or" binary operation.

Place these two points on an imaginary horizontal line below the points, 001, 010,

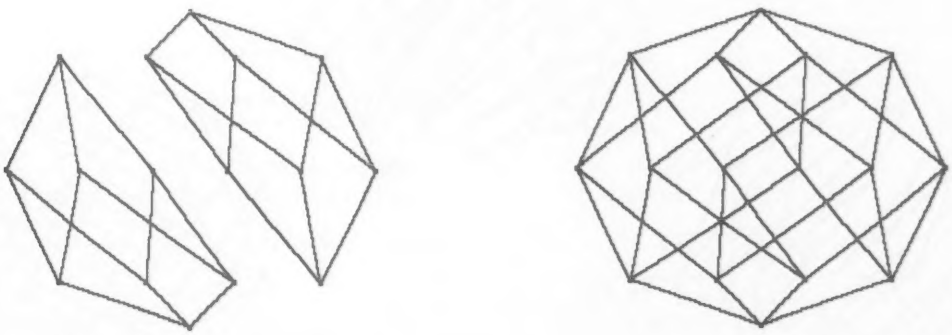


Figure 1. An N-space cube can be made by placing two (N-1)-space cubes next to each other and then connecting each corner of one cube to the same corner of the other cube. In the picture above, two three-space cubes have been slightly distorted into a shape which is good for displaying a four-space cube. When identical corners of each three-space cube are connected with line segments, a four-space cube is created.

and 100. Draw a line from 001 to these new adjacents. Move from the point 001 to the point 010 and figure out what its adjacents are. They are 011 which is already on the line below 010, and 000 which is on the line above and 110 which is a new point which should be placed on the same line with 011 and 101. Draw lines from 010 to all of its adjacents.

Next find the adjacents for 100. You will notice that they are all on the paper. They are 101, 110 and 000. Draw lines to these adjacents from 100. There is only one more adjacent to create. It is found by moving down to the next line of adjacents and finding the number which differs from 011 by one binary digit only, and which is not already on the paper.

It is the point 111. Place it on a line below 110, 101 and 011. If you connect line segments between 111 and its adjacents you will have created a rather lop-sided two-dimensional representation of a three-space cube.

You must remember that even though the angles of the cube are not those that you traditionally think of as belonging to a picture of a cube, it is still a cube. All of the angles in a "cube" are 90 degrees. But when we try to draw those angles in two dimensions they become distorted.

You must remember this when you plot five and six-space cubes, because you may see four connected lines which are of unequal lengths and which do not look anything like squares. Nonetheless, any four lines which link together to form a closed figure represent a square with 90 degree angles. It is just that when we display them in two-space, they look very squashed. Almost all of the angles in an N-space cube will be distorted when viewed in less than N dimensions.

Almost all of the angles in an N-space cube will be distorted when viewed in less than N dimensions.

But I have strayed from the main point. You have just created an N-space cube by starting at an arbitrary point and creating a map of all of the points which were adjacent to the first and subsequent points.

This method can be applied to any N-space cube. I have used it to draw seven-space cubes by hand. By the way, it isn't very fun drawing seven-space cubes by hand. It turns out I am no better at figuring out adjacents than I am at integrating. Just when I am about finished drawing a cube, I draw a line to the wrong point . . . in ink.

Pascal's Triangle

If you decide to create larger cubes by hand, here is an oddity to help you. The Nth level of Pascal's triangle describes the number of points on each horizontal level of the cube you are creating. It also shows you how many levels there should be in the cube. There are always N+1 levels in an N-cube. Pascal's triangle looks like this:

```
1
1  1
1  2  1
1  3  3  1
1  4  6  4  1
1  5 10 10  5  1
1  6 15 20 15  6  1
1  7 21 35 35 21  7  1
```

The top line of Pascal's triangle would correspond to a zero-space cube. That is, a zero-space cube has only one level. It couldn't have any more, since it only has one point. The fifth line of Pascal's triangle would correspond to a four-space cube, which has five levels.

There would be one point on the first level, four points on the second horizontal level, six points on the third level, four on the fourth, and one last point on the fifth level.

A seven-space cube (represented by the eighth line) would have one point on one line, seven on the next line or level, 21 points on the third line, and so on. Knowing how many points should be on each line gives you a convenient method of checking to see if you missed one of the adjacents which should be on that level.

Because of this feature, I call this type of cube a "Pascal's triangle cube." Still, it isn't easy to draw them by hand. It is too easy to make mistakes.

So the computer enters the picture to save the day. Once the computer is programmed properly, it makes fewer

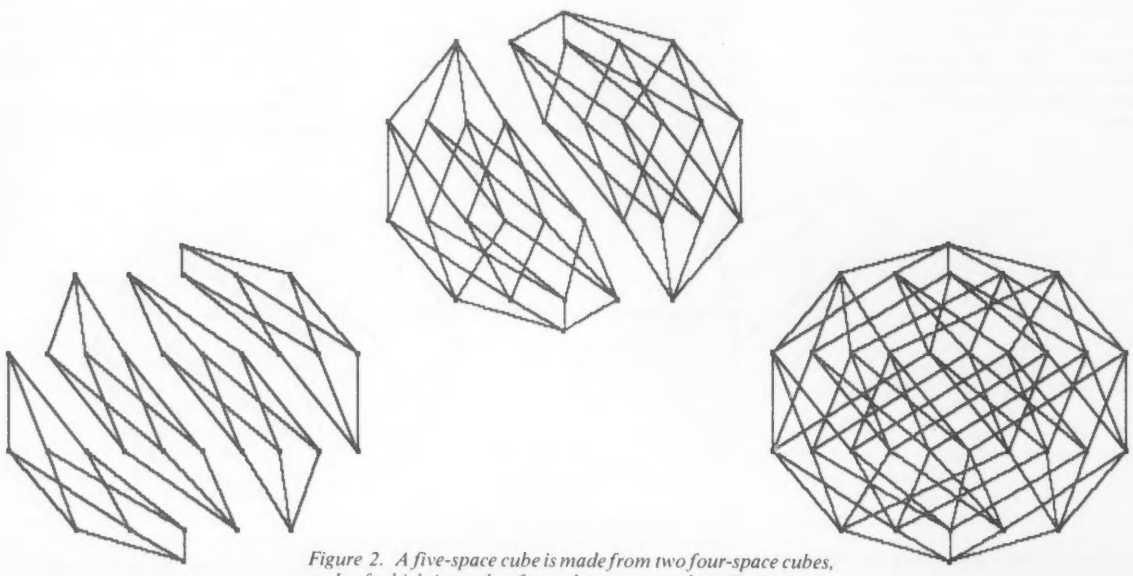
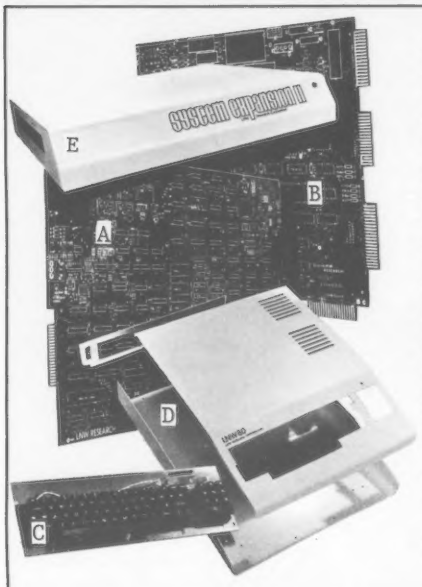


Figure 2. A five-space cube is made from two four-space cubes, each of which is made of two three-space cubes. Here you see the four three-space cubes which can be made into two four-space cubes, which combine to make a five-space cube.

COMPUTER KITS – FROM $69.95



LNW SEMI-KITS can save you hundreds of dollars. By obtaining your own parts at the lowest possible cost and assembling the **LNW SEMI-KITS,** you can have the most highly acclaimed microcomputer in the industry – the **LNW80.** The **LNW SEMI-KITS** are affordable modules. You can start with a modest cassette system and expand to a full 4Mhz TRS-80 compatible system with 5 or 8 inch double density disks and color at any time.

A. LNW80 CPU – Made of high quality FR4 glass epoxy double sided circuit material, with plated-through holes and gold edge connector. It is fully solder-masked and silk screened. Here are just some of the outstanding features you will have when your **LLNW80** CPU board is fully assembled: • 16K RAM • Color and black and white video • 480 x 192 high resolution graphics • 64 and 80 column video • 4 Mhz Z80A CPU • Upper and lower case display • 500 and 1000 baud cassette I/O – **$89.95**

B. SYSTEM EXPANSION – Expand the **LNW80** computer board, **TRS-80** and **PMC-80** computer with the following features: • 32K memory • Serial RS232C and 20Ma port • Real time clock • Parallel printer port • 5 inch single density disk controller • Expansion bus (screen printer port) • Onboard power supply • Solder-masked and silk screened legend – **$69.95** (tin plated contacts) – **$84.95** (gold plated contacts)

C. KEYBOARD – 74 key expanded professional keyboard – includes 12 key numeric keypad. Fully assembled and tested. – **$99.95**

D. COMPUTER CASE – This stylish instrument-quality solid steel case and hardware kit gives your **LNW80** that professional factory-built appearance. – **$84.95** Add $12.00 for shipping.

E. SYSTEM EXPANSION CASE – This stylish instrument-quality solid steel case and hardware kit gives your **SYSTEM EXPANSION** interface that professional factory-built appearance. – **$59.95** Add $10.00 for shipping.

F. LNW80 CPU – HARD TO FIND PARTS KIT – **$82.00**

G. LNW80 VIDEO – HARD TO FIND PARTS KIT – **$31.00**

H. SYSTEM EXPANSION – HARD TO FIND PARTS KIT – **$27.50**

I. LEVEL II ROM set. (6 chip set) – **$120.00**

VISA and **MasterCard** accepted. Add $3.00 for shipping plus $1.00 for each additional item. All shipments via UPS surface. Add $2.00 for U.S. Mail. Shipments outside continental U.S.: funds must be U.S. dollars. Sufficient shipping costs must be included with payment.

ORDERS & INFORMATION – (714) 544-5744
SERVICE – (714) 641-8850

LNW Research Corp.

2620 WALNUT Tustin, CA. 92680

CIRCLE 174 ON READER SERVICE CARD

Finally you can realize the FULL graphic capabilities of your printer.

- Any area of the Hi-Res screen can be printed as large or small as you like.
- Zoom "Window" feature allows you to frame and see the specific area of the Hi-Res screen to be printed.
- Picture can be printed horizontally or vertically.
- Margins can be completely adjusted for custom placement of picture.
- Form feed and line feed can be controlled from the keyboard.
- Prints either Hi-Res screen 1 or 2.
- Prints charts, graphs or pictures.
- Menu driven . . . extremely easy to use.

ZOOM GRAFIX WORKS WITH ALL THESE PRINTERS:

- Apple Silentype
- NEC 8023
- Spinwriter
- Diablo
- Qume
- All Epsons
- Pro-Writer
- Starwriter
- All IDS
- All Anadex
- MPI-88G
- Xerox

Works with over 15 different interface cards

Only $39.95. Visa and MasterCard accepted.
Requires 48K Apple II or II+ and Applesoft in ROM or Apple in Apple II mode.

PHOENIX SOFTWARE, INC.

64 Lake Zurich Drive
Lake Zurich, IL 60047
(312) 438-4850

Copyright 1981 Phoenix Software, Inc.

Apple II, II+ and /// are registered trademarks of Apple Computer, Inc.

CIRCLE 214 ON READER SERVICE CARD

mistakes than its human counterpart. The computer code which is included in this article was written for an Apple II plus with 48K of memory using the Applesoft floating point Basic.

No attempt was made to use the space available efficiently because the code was originally developed on a DECsystem-10 computer, and I was not anxious to rewrite the code completely.

Much to my surprise, I was able to plot colored graphs of a seven-space cube, as well as all of the smaller cubes. I also have a Silentype thermal printer which I used to create hard-copies of the cubes. Here then is a discussion of what the code does.

The Program

The first section of code creates a list of all of the adjacent points for each and every point from 0 to 127. This list of adjacents uses an array which is 7 x 128. I could have created an adjacent each time I needed one, thereby saving most of the space that I used, but was too lazy to code the program that way.

The program tells you that it has created the lists of adjacents and then asks you whether you would like the cube drawn for you, or whether you would like to create it from the sets of lines which are made by connecting adjacents which differ in a particular digit.

The program then asks you what size cube you would like to plot. You can draw all of the N-cubes up to and including a seven-space cube.

Then the code asks you which type of cube you would like to plot. It draws three

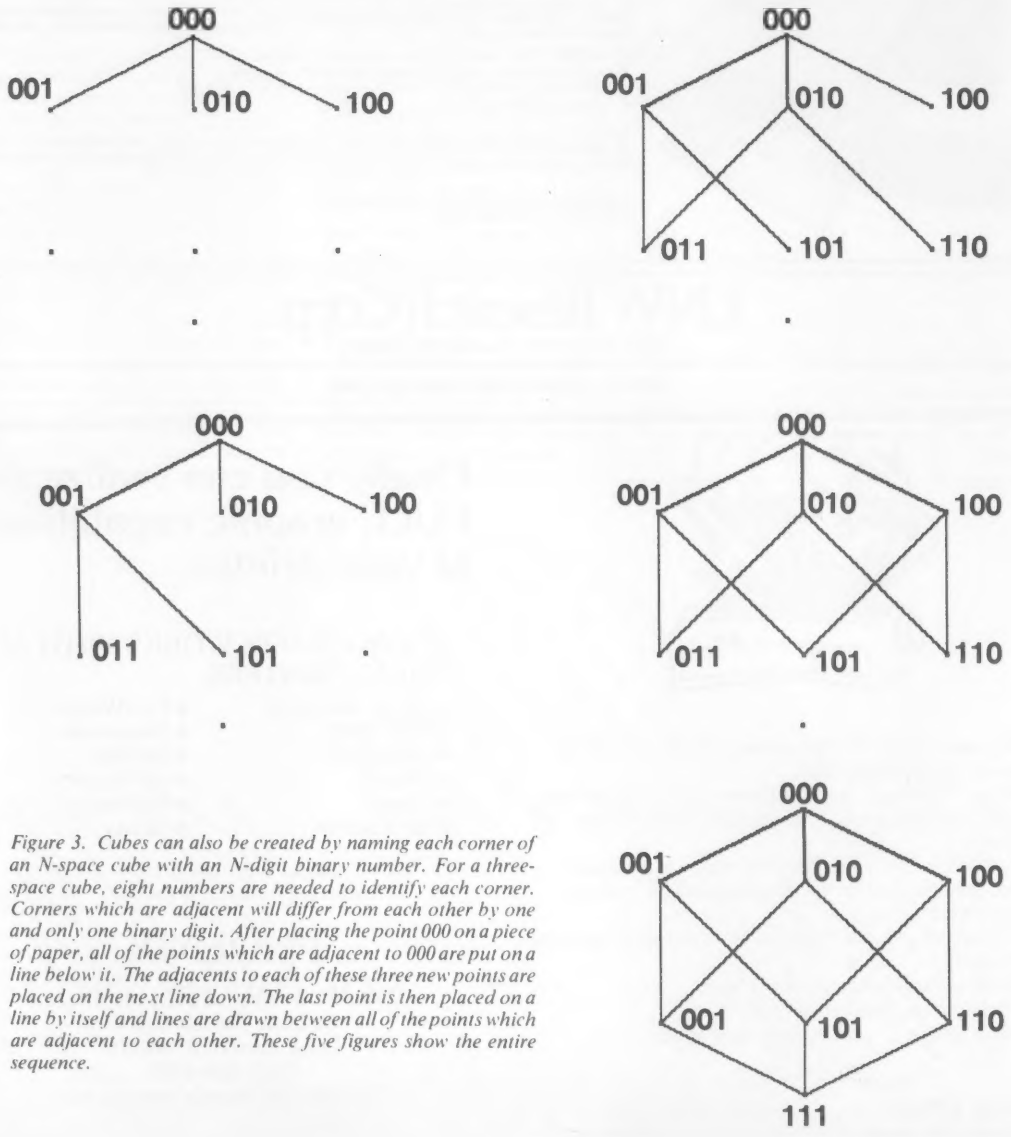


Figure 3. Cubes can also be created by naming each corner of an N-space cube with an N-digit binary number. For a three-space cube, eight numbers are needed to identify each corner. Corners which are adjacent will differ from each other by one and only one binary digit. After placing the point 000 on a piece of paper, all of the points which are adjacent to 000 are put on a line below it. The adjacents to each of these three new points are placed on the next line down. The last point is then placed on a line by itself and lines are drawn between all of the points which are adjacent to each other. These five figures show the entire sequence.

$2495
PUTS YOU IN BUSINESS

Introducing the MTI® BUSINESS Computer. We believe in offering you the best in complete, low cost computing.

M.T.I. MOD III PLUS B/140. We have taken the basic MODEL III, expanded the memory to 48K and added our M.T.I. double density, dual drive system. All M.T.I. BUSINESS computers include 4 Mhz speed-up for remarkable fast processing, a RS-232 Interface, Anti-Glare screen and cooling unit.

LOW PRICE. M.T.I. BUSINESS computers are priced from $2495. As an added incentive, we will give you a business software package **FREE** with the purchase of a MOD III PLUS BUSINESS computer. The software package has a retail value of $1588.00

All of this for $2495.

FREE SOFTWARE
ACOUNTING PACKAGE

- ACCOUNTS RECEIVABLE
- ACCOUNTS PAYABLE
- GENERAL LEDGER
- INVENTORY/SALES ANALYSIS
- PAYROLL
- INCLUDES AUDIO SELF-LEARNING CASSETTE
- GAMES
- EDUCATION SOFTWARE
- DOS PLUS 3.3

WORD PROCESSING

We are also offering a discount certificate entitling the purchaser to NEW SCRIPT by Pro Soft. With NEW SCRIPT you have complete word processing software.

OTHER MODELS AVAILABLE:

MOD III PLUS 240-B. Same as the MOD III-B/140 but has double storage capacity and dual headed 40 track drives.

MOD III PLUS 280-B. Has 1.5 Megabytes storage and 2 dual headed 80 track double density disk drives.

MOD III/WINCHESTER-B. Our largest business computer system. 8.2 megabytes of storage. Includes a 7.5 megabyte WINCHESTER hard disk and 80-track dual head disk head.

OPTIONS:

* LETTER QUALITY PRINTER
* WINCHESTER CP/M 2.2

WANT MORE? For more information call any of our authorized sales centers.

OVER 100 AUTHORIZED DEALERS
CALL 714-979-9923
for the dealer nearest you

MICROCOMPUTER TECHNOLOGY INC.
3304 W. MACARTHUR, SANTA ANA, CA 92704
(714) 979-9923 • TWX 910-595-1902 MTISNA

Call or write for free brochure:
U.S. PRICES F.O.B. SANTA ANA
CALIFORNIA AND MAY VARY BY AREA.

CP/M is a registered trademark of Digital Research, Inc.
TRS-80® is a registered trademark of Tandy, Corp.
M.T.I. is a registered trademark of Microcomputer Techonology, Inc.

CIRCLE 179 ON READER SERVICE CARD

types of cubes. For two of the types, it places all of the corners of any N-space cube in a circle. It really doesn't matter where the "corners" of the cube are placed, as long as each point remains connected to all of its adjacents by single line segments.

A mathematician would tell you that as long as the connectivity of all of the points remains the same, then no matter where you put the corners, the cube remains topologically equivalent.

One of the "circle cubes" comes out looking twisted. So I call it a twisted circle cube. The twisted circle cube looks as if it could be untwisted if the correct portions of the cube were moved, and, in fact, it can.

The result is the second type of cube which the program draws. I call it an "untwisted circle cube." The reason becomes obvious the first time you view the two types of cubes.

The third type of cube is the type which we have discussed already, where the points of the cube are placed on multiple horizontal levels.

But no matter which type of cube you wish to display, two things must be determined before the cubes can be plotted. The order in which the points will be used must be determined, and the X-Y co-ordinates for each point must be calculated.

For instance, in the twisted circle cube, the X-Y co-ordinates are calculated in sequence, one right after the other as we progress around the circle. The points are used sequentially, starting with point number 1.

When all of the corners are connected to their adjacent corners, a twisted cube results. It looks as if you could untwist certain portions of the cube, and many of the line segments would not cross each other. Indeed that is the case.

By changing the order in which the points are used, the cube can be untwisted. So when you have decided which type of cube to plot, and you have decided what size N-cube you want to plot, the order in which the points will be used is calculated, and then the X-Y co-ordinates of those points are calculated.

Next, the program plots tiny figures which mark the position of each of the corners. It does this to show you where the corners of the cube are located. If your monitor is a color TV, the points will be plotted in different colors depending on where they are plotted. This is due to the funny ways TVs create their color.

When the program finishes plotting the corners, it will wait for you to enter sets of two numbers. The first number will indicate the color of the line to be drawn, and the second number will indicate which set of lines is to be drawn.

If the set of adjacents which differ in the first digit is to be plotted, the second of those two numbers will be a 1. If the set of lines for adjacents which differ in the seventh binary digit is to be drawn, the second number will be a 7.

Two of the colors are black, which means that you can erase lines as well as draw them. That is, you can draw with black, which is the color of the background. There are eight colors which are numbered from 0 to 7. The colors may differ on different televisions.

Also, if a –1 is entered for either a color, or a set of lines, the user is returned to the point in the program where he can plot another N-space cube. If the second number is –1, the user will be asked whether he wants the picture to be printed on a Silentype printer. The printer should either be installed in slot #1 or the program should be changed.

If the user then types anything but YES, he is returned to plot another N-space cube. Unfortunately, since the program is usually displaying what is being drawn, you can't see the program prompts most of the time. So you must remember what to type. Because of this, I have included an actual run of the program so you have a working example.

The lines which are completely capitalized are part of the computer run, while the lines in regular type are comments which I have added to tell you what is going on.

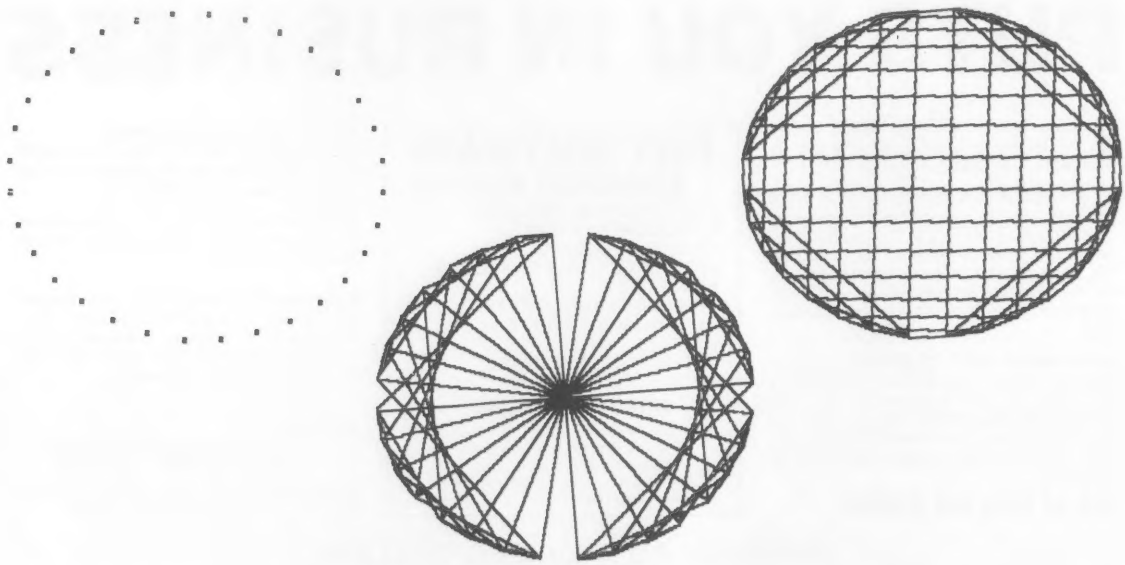


Figure 4. It isn't necessary to place the corners for a cube in any particular position. As long as each corner is connected to its adjacent corners with single line segments, the end result can still be called a cube. In this figure the 32 corners of a five-space cube have been placed in a circle. If the corners are labeled consecutively from the bottom and progressing counter-clockwise, a "twisted circle cube" results when all of the points are connected to their adjacent points. It appears as if the cube could be untwisted by changing the position of some of the corners. When this is done, an "untwisted circle cube" appears.

TOGETHER, CENSORED, THE INSPECTOR™ AND WATSON™ GIVE YOU TOTAL CONTROL OF YOUR APPLE AND ITS DISKS.

CENSORED

Puts all your disk and memory utilities together where they belong — *inside* your Apple. Eprom or disk version is always at your fingertips. Search memory and disks forward and backwards, read nibbles, map disk space, locate strings, the uses are endless. At your local dealer or direct— THE INSPECTOR, $59.95.

Watson™ The Inspector's Assistant Includes such goodies as scrolling screen dump, disassembler that shows ASCII, file follower of file, track/sector list-finder by *name*, disk-sector lockout, disk comparer, much more. At your local dealer or direct— WATSON,* $49.95.

If you're at all serious about programming or about business use of your Apple, you must have these interactive utilities. MasterCard and Visa holders order toll-free, 1-800-835-2246.

OMEGA MICROWARE, INC.™

222 SO. RIVERSIDE PLAZA • CHICAGO, IL 60606 • 312-648-4844

*Requires The Inspector

Apple is a registered trademark of Apple Computer, Inc

1+1+1=4

3 PRODUCTS TO ADD A 4TH DIMENSION OF POWER TO YOUR APPLE.

RAMEX-16™ *(Look Ma, no straps!)* The one 16-K memory expansion card for your Apple that *requires no unnecessary surgery.* This board just plugs in with no strap or additional connections. In spite of its quality, the Ramex-16™ costs just $139.95, complete with a *one year* limited warranty.

A complete turnkey memory management system on a disk — using either one or two 16K cards. HIDOS™ loads DOS onto one RAM card and with the second card loads an alternate language onto another. SOLIDOS™ turns a 16K card into a fast, 45-sector disk-drive emulator. At your local dealer or direct for just $34.95.

If you use VisiCalc™, then you must have THE CONSOLIDATOR. It will save you hours of keyboard time, by allowing you to manipulate totals of separate files *without reentering them.* Easy to use, invaluable to own. Just $49.95 at your dealer or direct.

All three of these together help make your Apple a more complete business system — giving you expanded memory, extra convenience, sure control. MasterCard and Visa holders order toll-free, 1-800-835-2246.

OMEGA MICROWARE, INC.™

222 SO. RIVERSIDE PLAZA
CHICAGO, IL 60606
312-648-4844

Apple is a registered trademark of Apple Computer, Inc
VisiCalc is a registered trademark of Personal Software, Inc

CIRCLE 198 ON READER SERVICE CARD

N-Space Cubes, continued...

Sample Run

```
RUN CUBES

THIS SECTION OF CODE CREATES THE

ADJACENTS FOR ALL OF THE 'CORNERS'

OF UP TO 7-SPACE CUBES.
```

The program sits there and churns for about 30 seconds.

```
THE ADJACENTS HAVE NOW BEEN CREATED.

DO YOU WANT ME TO DRAW THE

ENTIRE CUBE FOR YOU? (Y OR RETURN) N
```

Anything except Y means that you want to draw the cube yourself.

```
WHAT SIZE N-CUBE DO YOU

WANT TO PLOT? (1-7) 5
```

I wanted to draw a five-space cube, so I entered 5.

```
(1) TWISTED CIRCLE CUBE

(2) UNTWISTED CIRCLE CUBE

(3) PASCAL'S TRIANGLE CUBE

WHICH CUBE DO YOU WISH TO PLOT? 3
```

I wanted to plot the Pascal's Triangle five-space cube.

```
THE PROGRAM IS NOW CALCULATING

THE ORDER IN WHICH THE 32

POINTS OF THE CUBE WILL BE PLOTTED.
```

It sits there and thinks for a while . . .

```
THE PROGRAM IS CREATING THE X-Y

CO-ORDINATES FOR EACH CORNER

OF A PASCAL'S TRIANGLE TYPE OF CUBE
```

It sits there and thinks some more . . .

```
READY TO PLOT. (PRESS 'RETURN')
```

If you don't press the carriage return key, it will sit there forever. When you do press return, the screen will be blanked, and the points of the cube will be plotted. Then, although you won't see the prompt, the program will ask you for a color and line set. Each point of a five-space cube will have five adjacents so you will be able to specify five sets of lines. The five sets are: the set of adjacents which differ in only the first digit, the set of adjacents which differ in only the second digit, and the three sets of adjacents which differ in the third, fourth and fifth binary digits respectively.

```
WHAT COLOR AND LINE SET? 7,1

WHAT COLOR AND LINE SET? 7,2

WHAT COLOR AND LINE SET? 7,3

WHAT COLOR AND LINE SET? 7,4

WHAT COLOR AND LINE SET? 7,5
```

At this point, the cube is entirely plotted, although you never saw the "what color & line set" messages. 7 is white on my television, while 4 is black, so now I'll erase sets of lines.

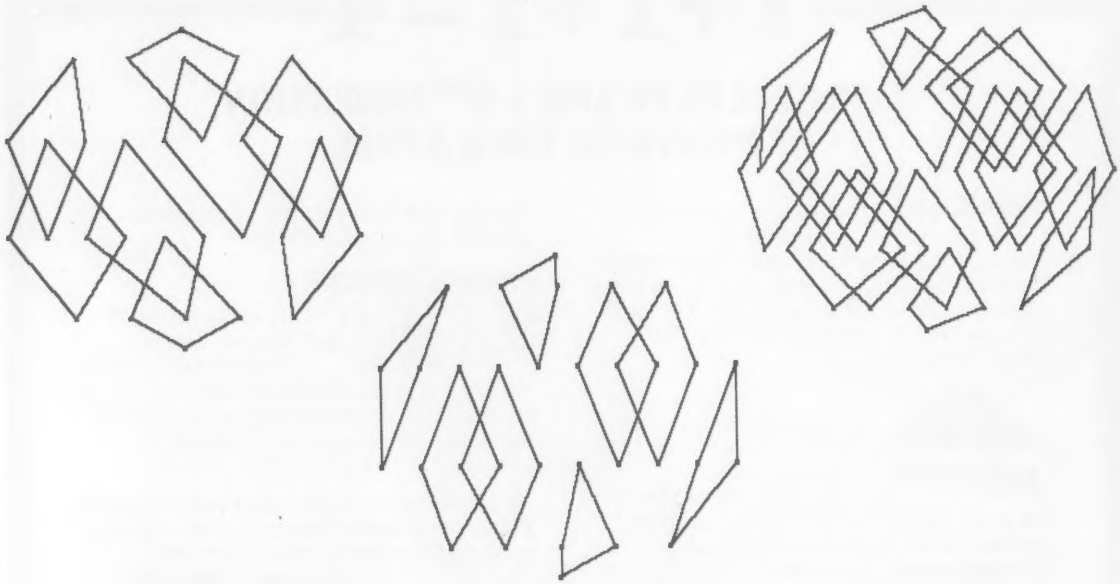
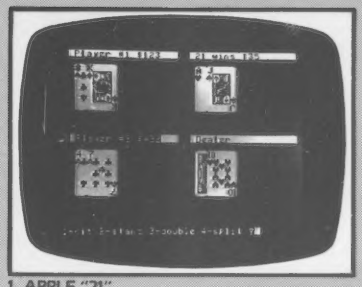
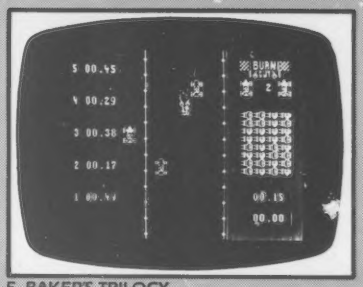


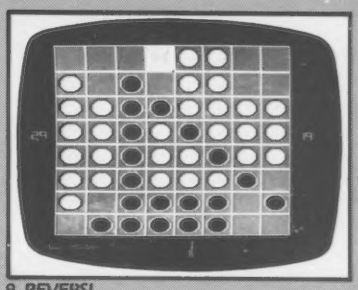
Figure 5. Many different designs can be produced by plotting only portions of the cubes. These figures illustrate some of those designs. Each angle actually represents a 90 degree angle, but since it is being displayed on a two-dimensional surface, it can only be shown distorted out of shape. In all of the pictures where the figures are composed of four lines, the figures are squares created by two sets of lines. For instance, the first figure is composed of the set of adjacents which differ in the second digit, and the set of adjacents which differ in the fourth digit. The second figure is created by drawing lines between points which differ in the second digit, and the points which differ in the third digit. The first two figures are portions of a five-space cube. The third figure is a six-space cube with only the 2 and 4 line sets drawn.



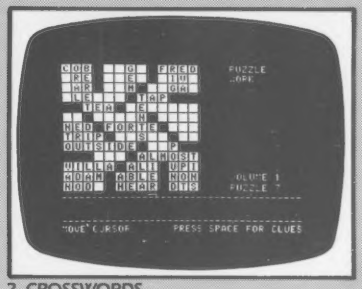
1. APPLE "21"



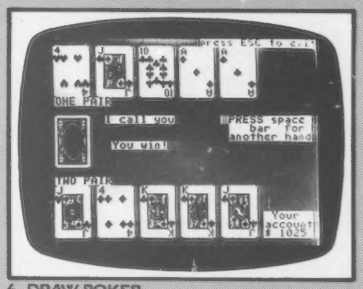
5. BAKER'S TRILOGY



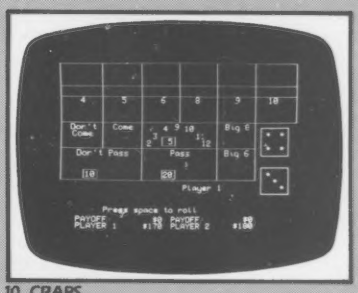
9. REVERSI



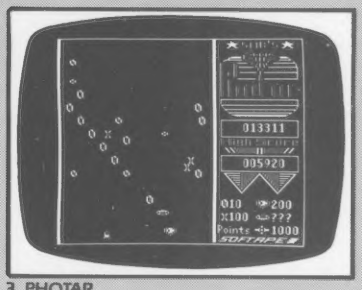
2. CROSSWORDS



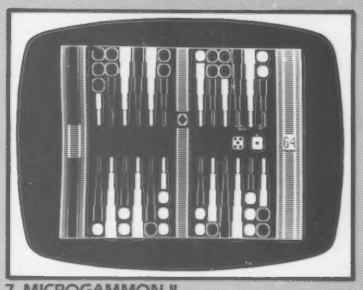
6. DRAW POKER



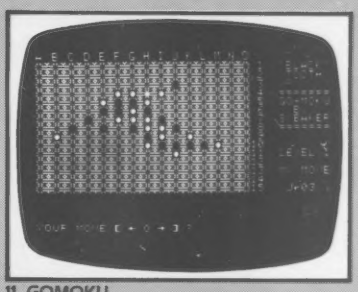
10. CRAPS



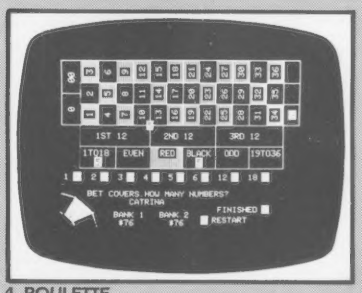
3. PHOTAR



7. MICROGAMMON II

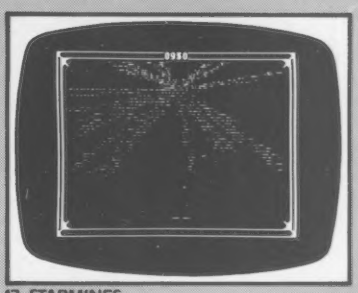


11. GOMOKU



4. ROULETTE

8. BEST OF BISHOP



12. STARMINES

PLAY TO WIN WITH SOFTAPE GAMES!

Programs available on diskette only

1. APPLE "21"—A fast-paced game of wits for 1 to 3 players with intricate high-resolution playing cards. **$24.95**

2. CROSSWORDS—An excellent game with 24 puzzles on a disk. You can solve them, modify them, or create your own. **$24.95**

3. PHOTAR—Fast, mean and out to get you—Photar is a colorful deep space game that will keep you firing. **$29.95**

4. ROULETTE—A realistic simulation of an all-time favorite casino game with a Monte Carlo spinning wheel. **$24.95**

5. BAKER'S TRILOGY—Three of Steve Baker's finest games: PLANETOIDS (space) BURNOUT (racing), BUBBLES (laser). **$24.95**

6. DRAW POKER—Like being in Vegas; compete against a crafty card player in this magnificent poker game. **$24.95**

7. MICROGAMMON II—A triumph in board game simulations, the animation accents "intelligence" by moving pieces. **$19.95**

8. BEST OF BISHOP—9 of Bob's best: ROCKET PILOT, SAUCER INVASION, STAR WARS, SPACE MAZE, BOMBER and more. **$39.95**

9. REVERSI—This challenging machine language program guarantees great graphics, intelligence, and speed. **$24.95**

10. CRAPS—A 1 or 2 player, high-resolution dice game where you play the field, passline, or hardway rolls. **$24.95**

11. GOMOKU—A sophisticated game of five-in-a-row, you play against an opponent with 3 levels of skill. **$19.95**

12. STARMINES—Thrill to the challenge of flying through space set with mines. 5 Hi-res levels keep you firing. **$19.95**

Available for the Apple II • Visa, MasterCard, C.O.D. or check accepted • Add $1.00 for shipping & handling

SOFTAPE • 10432 BURBANK BOULEVARD • NORTH HOLLYWOOD, CALIFORNIA 91602 • 213/985-5763

CIRCLE 239 ON READER SERVICE CARD

```
WHAT COLOR & LINE SET? 4,1

WHAT COLOR & LINE SET? 4,2

WHAT COLOR & LINE SET? 4,3

WHAT COLOR & LINE SET? 4,4

WHAT COLOR & LINE SET? 4,5
```

Now, nothing is left but the "corners" which we originally plotted. If you now input -1,0 the plot will disappear and you will be able to choose another type and size of N-cube.

```
WHAT COLOR & LINE SET? -1,0

DO YOU WANT ME TO DRAW THE

ENTIRE CUBE FOR YOU? (Y OR RETURN) ^C
```

A control-C will get you out of the program at any time. That may be an inelegant way to exit from the program, but it works.

One of the nice features about plotting individual sets of lines, instead of plotting the entire cube all at once, is that you can see how N-space cubes are made from two (N-1)-space cubes. Cubes of lesser degree can also be seen by choosing particular sets of lines. You can discover many interesting designs and patterns by playing with the sets of lines in any of the N-cubes. Different combinations of those sets of lines will give you a better idea of how N-cubes are made.

Now that you know the structure of an N-cube and know several ways to draw them, perhaps you can think of other ways to display them. The symmetries involved are fascinating. Cubes are good for stretching your imagination and can lead you to many interesting discoveries. □

Program Listing

```
10  REM  THIS PROGRAM CREATES N-DIMENSIONAL CUBES
20  REM  WHERE N VARIES FROM 1 TO 7
30  REM  WRITTEN SEPT 1981 BY
40  REM  DENNIS CLARK
50  REM  R2 BOX 264
60  REM  PAINT ROCK FERRY ROAD
70  REM  KINGSTON, TENN. 37763
80  REM
90  HOME
100  PRINT "THIS SECTION OF CODE CREATES THE"
110  PRINT
120  PRINT "ADJACENTS FOR ALL OF THE 'CORNERS'"
130  PRINT
140  PRINT "OF UP TO 7-SPACE CUBES."
150  PRINT
160  DIM ADJ(7,128)
170 N = 7
180 ITMP = 2 ^ N
190 NN = N - 1
200  FOR J = 0 TO NN
210 JJ = J + 1
220 LL = 2 ^ J
230 KK = LL
240 JK = 1
250 L2 = 2 * LL
260  FOR K = 1 TO LL
270 ADJ(JJ,JK) = KK
280 JK = JK + 1
290 KK = KK + 1
300  NEXT K
310 KK = KK - L2
320  FOR K = 1 TO LL
330 ADJ(JJ,JK) = KK
340 JK = JK + 1
350 KK = KK + 1
360  NEXT K
370 KK = KK + L2
380  IF (JK <  = ITMP) GOTO 260
390  NEXT J
400  PRINT "THE ADJACENTS HAVE NOW BEEN CREATED"
410  DIM XY(128),X(128),Y(128),P(9),IP(9)
```

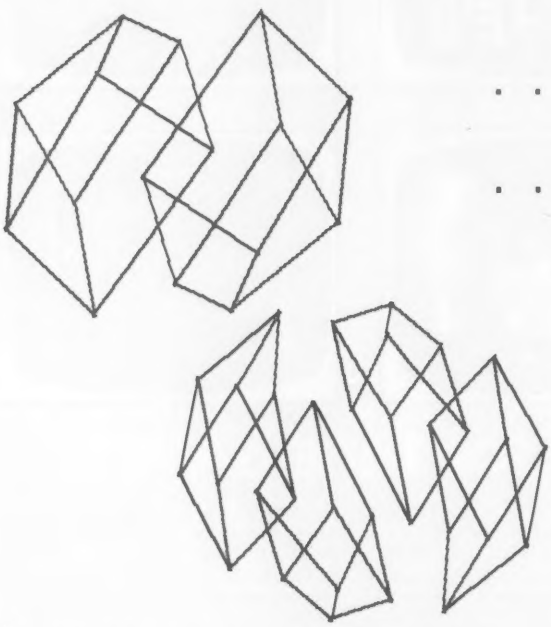


Figure 6. All figures which are composed of eight lines are actually three-space cubes residing in a higher-space cube. The first figure shows two three-space cubes created with the 1, 2, and 3 line sets in a four-space cube. The next figure shows three-space cubes inside a five-space cube.

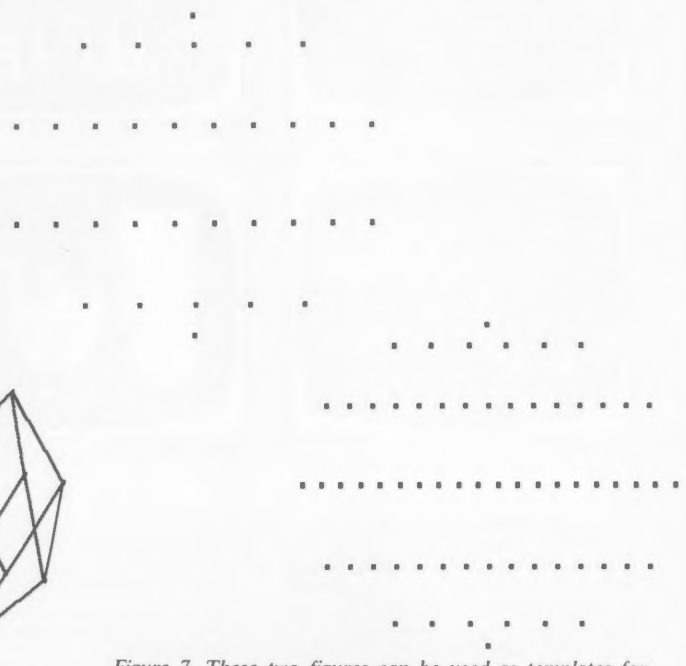
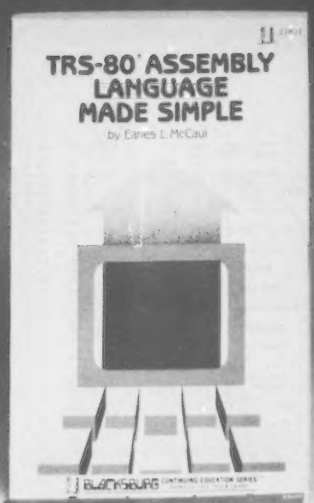


Figure 7. These two figures can be used as templates for creating five- and six- space cubes. The first figure contains the points for a five-space Pascal's triangle cube. The second figure is a six-space cube without the lines between adjacents drawn. Although it is possible to create the cubes by hand, it is easier to let a computer do the work.

Books your memory can bank on.

B. Dalton has a wide selection of computer books by Howard W. Sams, the nation's leading publisher of technical books. Here is just a sampling:



TRS-80 ASSEMBLER LANGUAGE MADE SIMPLE
$12.95

COMPUTER GRAPHICS PRIMER
$14.95

VIC-20 PROGRAMMER'S REFERENCE GUIDE
$16.95

APPLESOFT LANGUAGE
$10.95

EXPERIMENTS WITH ARTIFICIAL INTELLIGENCE
$8.95

Howard W. Sams & Co., Inc.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

BOOK TITLE _____

☐ Payment enclosed

☐ American Express _____

☐ Master Charge _____

☐ Visa _____

Expiration date _____

B. Dalton Bookseller #310
5001 Excelsior Blvd.
Minneapolis, MN 55416

POSTAGE & HANDLING $1.50
MN Residents Add 5% State Tax

B. Dalton
America's Favorite Bookseller

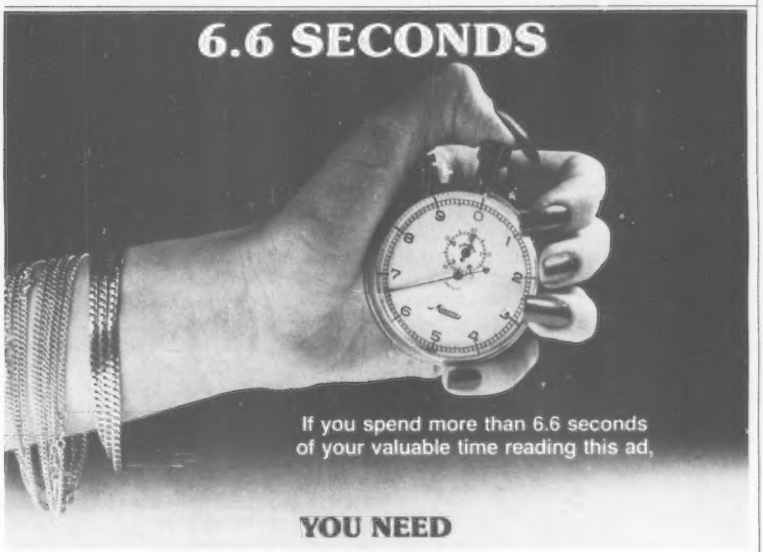
Order by mail or visit your local B. Dalton store. See Yellow Pages for locations.

CIRCLE 148 ON READER SERVICE CARD

N-Space Cubes, continued...

```
420 Q$ = "": REM  CONTROL-Q
430 D$ = "": REM  CONTROL-D
440  TEXT
450  PRINT
460  PRINT "DO YOU WANT ME TO DRAW THE ENTIRE"
470  PRINT
480  INPUT "CUBE FOR YOU? (Y OR RETURN) ";ZG$
490  PRINT
500  PRINT
510  PRINT "WHAT SIZE N-CUBE DO YOU"
520  PRINT
530  INPUT "WANT TO PLOT? (1-7) ";N
540  PRINT
550  PRINT
560  IF N > 7 OR N < 1 THEN  GOTO 440
570  PRINT "(1) TWISTED CIRCLE CUBE"
580  PRINT
590  PRINT "(2) UNTWISTED CIRCLE CUBE"
600  PRINT
610  PRINT "(3) PASCAL'S TRIANGLE CUBE"
620  PRINT
630  PRINT
640  INPUT "WHICH CUBE DO YOU WISH TO PLOT? ";PL
650  IF PL > 3 OR PL < 1 THEN  GOTO 570
660 NN = 2 ^ N
670  PRINT
680  PRINT
690  PRINT "THE PROGRAM IS NOW CALCULATING"
700  PRINT
710  PRINT "THE ORDER IN WHICH THE ";NN
720  PRINT
730  PRINT "POINTS OF THE CUBE WILL BE PLOTTED"
740  PRINT
750  ON PL GOTO 1000,2000,3000
1000  REM  THIS SECTION OF CODE IS FOR THE
1010  REM  TWISTED CIRCLE TYPE OF CUBE
1020  FOR J = 1 TO NN
1030 XY(J) = J
1040  NEXT J
1050  PRINT
1060  PRINT
1070  PRINT "THE PROGRAM IS CREATING THE X-Y"
1080  PRINT
1090  PRINT "CO-ORDINATES FOR EACH CORNER"
1100  PRINT
1110  PRINT "OF A TWISTED CIRCLE CUBE."
1120  PRINT
1130  GOTO 2260
2000  REM  THIS SECTION OF CODE IS FOR
2010  REM  THE UNTWISTED CIRCLE CUBES
2020  FOR J = 1 TO NN
2030 XY(J) = J
2040  NEXT J
2050  FOR J = 1 TO N - 1
2060 J2 = 2 ^ J
2070 JL = 2 ^ (J - 1)
2080  FOR I = 1 TO NN
2090 IN =  INT ((I - 1) / J2)
2100  IF (( INT (IN / 2) * 2) = IN) THEN  GOTO 2170
2110 ID = I - IN * J2
2120  IF (ID > JL) THEN  GOTO 2170
2130 IP = J2 * IN + J2 - ID + 1
2140 TMP = XY(I)
2150 XY(I) = XY(IP)
2160 XY(IP) = TMP
2170  NEXT I
2180  NEXT J
2190  PRINT
2200  PRINT "THE PROGRAM IS CREATING THE X-Y
2210  PRINT
2220  PRINT "CO-ORDINATES FOR EACH CORNER"
2230  PRINT
2240  PRINT "OF AN UNTWISTED CIRCLE CUBE."
2250  PRINT
2260 WDTH = 278
2270 HGT = 189
2280 XX = 0
2290 XC = WDTH / 2
2300 YC = HGT / 2
2310 SN = 6.28 / 2 ^ N
2320  FOR J = 1 TO 2 ^ N
2330 X(XY(J)) =  SIN (XX) * XC + XC + 1
2340 Y(XY(J)) =  COS (XX) * YC + YC + 1
2350 XX = XX + SN
2360  NEXT J
2370  GOTO 10000
3000  REM  THIS SECTION OF CODE IS FOR THE
3010  REM  PASCAL'S TRIANGLE TYPE OF CUBE
3020 XY(1) = 0
3030 XY(NN) = NN - 1
3040 NE = 2
3050 N2 = NN / 2
3060  FOR J = 1 TO N2
3070  FOR K = 1 TO N
3080  IF XY(J) >  = 2 ^ (K - 1) THEN  GOTO 3120
3090 XY(NE) = ADJ(K,XY(J) + 1)
3100 XY(NN - NE + 1) = NN - XY(NE) - 1
3110 NE = NE + 1
3120  NEXT K
3130  NEXT J
3140  PRINT
3150  PRINT "THE PROGRAM IS CREATING THE X-Y"
3160  PRINT
3170  PRINT "CO-ORDINATES FOR EACH CORNER"
3180  PRINT
3190  PRINT "OF A PASCAL'S TRIANGLE TYPE OF CUBE"
3200  PRINT
3210 PI = 3.14159265
3220 NP1 = N + 1
3230  FOR J = 1 TO NP1
3240 IP(J) = 1
3250 P(J) = 1
3260  NEXT J
3270  FOR L = 2 TO N
3280  FOR J = 2 TO L
3290 P(J) = IP(J - 1) + IP(J)
3300  NEXT J
3310  FOR K = 2 TO L
3320 IP(K) = P(K)
3330  NEXT K
3340  NEXT L
3350 WDTH = 137
3360 HGT = 93
3370 I = 1
3380 ANG =  - PI * .5
3390 AI = PI / N
3400  FOR J = 1 TO NP1
3410 XWDTH =  COS (ANG) * WDTH
3420 XP = WDTH - XWDTH + 1.
3430 YV =  SIN (ANG) * HGT + HGT + 1.
3440  FOR K = 1 TO P(J)
3450  IF (P(J) - 1 = 0) THEN  GOTO 3470
3460 XINC = (XWDTH * 2.) / (P(J) - 1.)
3470 II = XY(I) + 1
3480 X(II) = XP
3490 XP = XP + XINC
3500 Y(II) = YV
3510 I = I + 1
3520  NEXT K
3530 ANG = ANG + AI
3540  NEXT J
3550  FOR J = 1 TO NN
3560 XY(J) = XY(J) + 1
3570  NEXT J
10000  PRINT
10010  INPUT "READY TO PLOT. (PRESS 'RETURN') ";DUMY$
10020  HGR2
10030  HCOLOR= 7
10040  FOR J = 1 TO NN
10050  HPLOT X(J) - 1,Y(J) - 1 TO X(J) + 1,Y(J) - 1
10051  HPLOT X(J) + 1,Y(J) - 1 TO X(J) + 1,Y(J) + 1
10052  HPLOT X(J) + 1,Y(J) + 1 TO X(J) - 1,Y(J) + 1
10053  HPLOT X(J) - 1,Y(J) + 1 TO X(J) - 1,Y(J) - 1
10060  NEXT J
10070  IF (ZG$ = "Y") THEN  GOTO 20000
10080  PRINT
10090  INPUT "WHAT COLOR  & LINE SET ? ";H,K
10100  IF H < 0 THEN  GOTO 440
10110  IF H > 7 THEN  GOTO 10080
10120  HCOLOR= H
10130  IF K < 0 THEN  GOTO 30000
10140  IF K < N + 1 THEN  GOTO 10170
10150  PRINT "BAD NUMBER TRY AGAIN";G$,G$,G$
10160  GOTO 10080
10170  FOR JJ = 1 TO NN
10180 J = XY(JJ)
10190  IF (ADJ(K,J) < J) THEN  GOTO 10220
10200 MJ = ADJ(K,J) + 1
10210  HPLOT X(J),Y(J) TO X(MJ),Y(MJ)
10220  NEXT JJ
10230  GOTO 10080
20000  FOR J = 1 TO N * 500
20010  NEXT J
20020  FOR KK = 1 TO NN
20030 K = XY(KK)
20040  FOR J = 1 TO N
```

```
20050  IF (ADJ(J,K) < K) THEN  GOTO 20080
20060 MJ = ADJ(J,K) + 1
20070  HPLOT X(K),Y(K) TO X(MJ),Y(MJ)
20080  NEXT J
20090  FOR L = 1 TO 4096 / NN
20100  NEXT L
20110  NEXT KK
30000  PRINT
30010  INPUT "END THE PLOT BY PRESSING 'RETURN' ";DUMY$
30020  PRINT
30030  INPUT "PRINT PICTURE? (YES OR RETURN) ";DUMY$
30040  IF DUMY$ >  < "YES" THEN  GOTO 440
30050  TEXT
30060  POKE  - 12529,255
30070  POKE  - 12525,64
30080  POKE  - 12524,0
30090  PRINT D$;"PR#1"
30100  PRINT
30110  PRINT Q$
30120  PRINT
30130  PRINT D$;"PR#0"
30140  POKE  - 12525,32
30150  POKE  - 12529,0
30160  POKE  - 12524,255
30170  GOTO 10000
30180  END
```

YOU NEED

SpeedRead+

- Optimized Systems Software, the company that brought you BASIC A+ and OS/A+, proudly presents another *"PLUS"*.
- ***SpeedRead+*** is the *world's first* speed reading tutor designed for use on your personal computer.
- ***SpeedRead+*** *begins* with training your eyes and mind to function as the incredible precision machine they were meant to be.
- ***SpeedRead+*** goes beyond mere words — it trains you to recognize phrases and columns instantly — it exercises your peripheral vision — it increases your comprehension.
- ***SpeedRead+*** matches *your* pace — now and in the future.

AVAILABLE NOW!

For 16K ATARI® computer with disk, Introductory Price **$59.95**

Coming soon for APPLE II®. Inquire about availability of TRS-80® and cassette versions.

SEE YOUR DEALER TODAY!

Call or write for a descriptive brochure of ***SpeedRead+***™ and other fine OSS products, such as OS/A+, BASIC A+, and TINY C®.

ATARI, APPLE II, TRS-80, and TINY C are trademarks of Atari, Inc., Apple Computer, Inc., Radio Shack, and Tiny C Associates, respectively. ***SpeedRead+*** is a trademark of Eagle Software and Optimized Systems Software.

Optimized Systems Software, Inc., 10379 Lansdale Ave., Cupertino, CA 95014, (408) 446-3099

CIRCLE 202 ON READER SERVICE CARD

We will meet or beat *any* price in the U.S.A. on

TRS·80 MICROCOMPUTERS

In fact, **no matter what price** you see advertised by Micro Management, Perry Oil, Pan American, or any authorized Radio Shack dealer for TRS-80 Computers with pure factory installed memory and full warranty, **we'll beat it!**

ATARI®

We have consistently offered the complete TRS-80, ATARI, EPSON, APPLE, and MAXELL lines at the best prices in the U.S.A. And we offer the best delivery from the largest inventory in the Northeast.

If you're looking for the best prices in the U.S.A., check the others but call Computer Discount of America.

TRS-80 and Radio Shack are trademarks of Tandy Co.

CALL TOLL FREE: 800-526-5313

Computer Discount of America

COMPUTER DISCOUNT OF AMERICA, INC.
15 Marshall Hill Road, West Milford Mall
West Milford, New Jersey 07480-2198
In New Jersey Call 201-728-8080

CIRCLE 133 ON READER SERVICE CARD

CIRCLE 125 ON READER SERVICE CARD

Screensaver

Andy Gamble

Screensaver grew from the need to draw on the screen quickly and to save the entire screen in some permanent form within a program. Take, for instance, the logo in Figure 1. How could I design that on the screen and save it to be used in other programs?

Previously I had been typing in "direct mode," fiddling about with a recalcitrant cursor and trying very, very hard to refrain from pressing Return at the edge of the screen.

Even using that method, the screen still needed to be saved in some way; the easiest was to leave a margin down the left side in which to place a series of statements like 10 PRINT".... Did I say easy?

A different technique is used here, one that I hope will give you ideas for other uses. The program splits rather neatly into three parts.

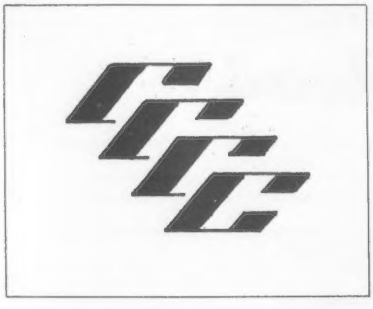
The first is a simplified method for drawing or printing on the screen. Insert/delete and return are inoperable, which prevents much gnashing of the teeth. All other keys repeat.

In the second part, the entire screen is saved in the form of DATA statements, which can be read by the third part, which is a small program to return the original screen.

The first part is quite straightforward. The program checks to see which key is pressed, and POKEs that character to the appropriate place on the screen, marked by a dummy cursor. The program further checks to see if the key is being held down, and if so the procedure is repeated.

When the screen design has been completed, shift-return starts the second part of the program. Each screen position is scanned (you can see the dummy cursor flying around here) and the PEEK values stored in a temporary array. The values in this array are in turn POKEd into the DATA statements at the beginning of the program. The zeros in lines 100 to 760 are thus replaced by the PEEK/POKE values of the screen characters.

Figure 1.



Now here is where a bit of ingenuity creeps in. Since most screen designs contain a great deal of blank space, and even quite small designs will necessarily fill all the 1000 places in the DATA statements, a technique was chosen to compact the information.

Briefly, the largest value stored in a DATA line would be 255, since that is the largest PEEK/POKE value possible. This means that all values from 256 to 999 would not normally be used.

In this program, the spaces in a design are not stored in their normal form (which would be a value of 32), but instead are merely counted. For instance, if while scanning the screen the program came across 80 successive spaces (two blank lines), this information would be stored in the DATA statement as 380. All non-space characters are, thus, stored normally, but all spaces are counted and the count plus 300 stored.

There is a small advantage here in that the largest number of contiguous spaces which can be stored is 699 (999-300), but this is more than offset by the great saving of program space.

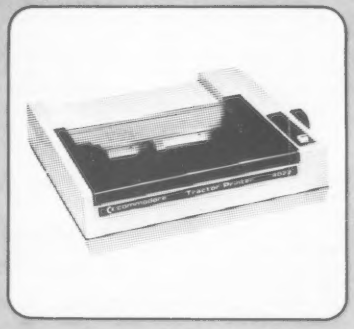
Lastly, an end-of-file marker of -99 is written in the last available DATA position. Once the screen is saved into the DATA lines, the rest of the program (lines 770 on), can be deleted. A Toolkit helps a great deal here.

In order to make use of the screen, a short program (Listing 2) should be appended to the DATA statements. Again, the Toolkit is useful. The program runs on Basic 3 CBM machines and requires 12K of memory.

Andy Gamble, Columbia College, 1619 West 10th Ave., Vancouver, B.C., Canada V6J 2A2.

commodore SHOW SPECTACULAR

8032-32K 80 COL CRT	
REG $1495	$1065
64K ADD-ON MEMORY	
REG $500	$395
9000 134K SUPER PET	
REG $1995	$1795
4032 32K 40 COL CRT	
REG $1295	$965
4016 16K 40 COL CRT	
REG $995	$765
8050-DUAL DISK 950K	
REG $1795	$1295
4040-DUAL DISK 343K	
REG $1295	$995
2031-SINGLE DISK 170K	
REG $695	$525
C2N-CASSETTE DRIVE	
REG $75	$65
4022-80 COL PRINTER	
REG $795	$595
8023P-136 COL PRINTER	
REG $995	$849
8300P-40CPS LTR QLTY	
REG $2250	$1995
8024-MANNESMAN TALLEY	
REG $1995	$1595
8024L-LETTER TALLEY	
REG $2495	$1995
25CPS-STARWRITER	
REG $1895	$1445
CBM-IEEE MODEM	
REG $279	$229
VOICE SYNTHESIZER	
REG $395	$329



PET TO IEEE CABLE	
REG $39.95	$34
IEEE TO IEEE CABLE	
REG $49.95	$39
VIC 20	
REG $299	$265
VIC 1540 DISK 170K	
REG $599	$499
VIC 1515 30CPS PRINTER	
REG $395	$349
VIC 1011 RS 232 INTER	
REG $49.95	$39
VIC 1112 IEEE INTER	
REG $99.95	$79

MATOR SHARK HARD DISK DRIVE

*Winchester Disk
*Commodore DOS 2.5
*24 Megabyte
$6475

Strobe 100 Plotter
*PET Interface
*Software Pack
$975

SCHOOL SPECIALS
3 for 2 Pricing
CALL US!

20% Off on Software

Special pricing on Atari, Apple, Digilog, Epson, Hayes Modem, Printwheels

PHILADELPHIA COMPUTER DISCOUNT©

P.O. Box 170 St. Davids, PA 19087 (215)687-8540

MAIL ORDER PHONE 1-800-345-1289

PREPAID ORDERS SHIPPED FREE
VISA & MASTERCARD ADD 3%
COD - UPS
PA RESIDENTS ADD 6% SALES TAX

CIRCLE 213 ON READER SERVICE CARD

H1181C

The Program

The following is a line-by-line description of the program:

Lines 100 to 760: These DATA statements will store the numerical values of all the characters on the screen. One thousand sets are needed in all, for the extreme case of each position being filled by a non-space character. Yes, I know there is 1001; the 1001st set stores the -99 end-of-file marker.

Lines 770 to 860: A few initializing statements.

Lines 870 to 1050: Move dummy cursor. Screen will not scroll, and cursor will not move off the screen.

Lines 1060 to 1080: Check RVS on or off.

Lines 1090 to 1200: Convert ASCII value to PEEK/POKE value and POKE to screen.

Lines 1210 to 1220: Fill the array.

Lines 1230 to 1400: POKE values into DATA statements.

Lines 1410 to 1490: Title page.

Lines 1500 to 1620: Instructions.

Lines 1630 to 1650: "Continue" subroutine.

The tremendous number of DATA lines are best entered into the program using the screen-editing facilities; that is, type line 100 as given, return, alter the line number to 110, return, and so on. The task is not as arduous as it may seem.

It is however, very important that these DATA lines be typed exactly as given. In particular, don't be tempted to put anything before them. The statement MS=1030 in line 1240 marks the position in memory of the first zero in line 100. In other words, it is where the program starts looking for zeros.

If you are typing this program for a machine other than a PET, this number will have to be changed. In this case, use your machine language monitor to find the location of the first zero. Other changes would include:

The POKE instruction in line 810 which sets the graphic mode.

Variable HM in line 880: The start of screen memory.

Variable KD in line 870: The location to show which key is pressed.

Variable SD in line 870: The location to show if the shift key is down.

Variable CC in line 890: Cursor character.

Variable CR in lines 930 to 1000: Cursor control characters.

Variable C2 in line 1020: End of screen memory.

Armed with that information, it should be possible to convert to any Microsoft or similar Basic.

Listing 1.

```
100 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
110 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
120 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
130 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
140 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
150 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
160 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
170 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
180 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
190 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
200 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
210 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
```

Lines 220 to 620 are similar.

```
630 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
640 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
650 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
660 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
670 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
680 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
690 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
700 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
710 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
720 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,060
730 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
740 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
750 DATA000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000
760 DATA000,000,000,000,000,000,000,000,000,000
770 REM SCREENSAVER ANDY GAMBLE OCT 81
780 REM COLUMBIA COLLEGE 1619 W10 AVE
790 REM VANCOUVER BC V6J 2A2
800 REM NEW ROMS (BASIC 3) ONLY
810 DIMSP(1000):POKE59468,12
820 GOTO1410
830 INPUT"□DO YOU NEED INSTRUCTIONS (Y/N)  ■■■■";Z$
840 IFZ$="■"THENPRINT"□";:GOTO830
850 Z$=LEFT$(Z$,1):IFZ$="Y"THEN1500
860 IFZ$<>"N"THEN830
870 PRINT"□";:KD=151:SD=152
880 HM=32768:C1=HM:C2=C1
890 CC=102:CB=PEEK(C1)
900 RV=0
910 GETCR$:IFCR$<>""THENCR=ASC(CR$)
920 IFPEEK(KD)=255THEN1040
930 IFCR=19ORCR=17ORCR=29ORCR=147ORCR=145ORCR=157THEN950
940 GOTO1060
950 IFCR=19THENC2=32768
960 IFCR=17THENC2=C1+40
970 IFCR=29THENC2=C1+1
980 IFCR=147THENC2=32768:PRINT"□";
990 IFCR=145THENC2=C1-40
1000 IFCR=157THENC2=C1-1
1010 IFC2<32768THENC2=C1
1020 IFC2>33767THENC2=C1
1030 CB=PEEK(C2):C1=C2
1040 POKEC1,CC:FORZZ=1TO30:NEXT
1050 POKEC1,CB:FORZZ=1TO30:NEXT:GOTO910
1060 IFCR=18THENRV=1:GOTO910
1070 IFCR=146THENRV=0:GOTO910
1080 IFCR=141THEN1210
1090 CP=CR
1100 IFCR<32THEN910
1110 IFCR>63ANDCR<129THENCP=CR-64
1120 IFCR>128ANDCR<160THEN910
1130 IFCR>159ANDCR<192THENCP=CR-64
1140 IFCR>191THENCP=CR-128
1150 POKEC1,CP+RV*128:C2=C1+1
1160 IFC2>33767THENC2=C1
1170 CB=PEEK(C2):C1=C2
1180 POKEC1,CC:FORZZ=1TO30:NEXT
1190 POKEC1,CB:FORZZ=1TO30:NEXT
1200 GOTO910
1210 FORI=1TO1000:C1=32767+I:SP(I)=PEEK(C1)
1220 POKEC1,CC:POKEC1,SP(I):NEXT
1230 PRINT"□□□□□□POKING VALUES INTO DATA STATEMENTS"
1240 PRINT"□PLEASE WAIT...":C=0:MS=1030
1250 FORI=1TO1000
1260 IFI=1000ANDSP(I)=32THENC=C+1:GOTO1290
```

```
1270 IFSP(I)=32THENC=C+1:NEXT
1280 IFSP(I-1)<>32THEN1330
1290 X$=STR$(C+100300):PRINT"■"I
1300 FORZZ=0TO2:POKEMS+ZZ,ASC(MID$(X$,5+ZZ,1)):NEXT:C=0
1310 MS=MS+1:IFPEEK(MS)=48ANDPEEK(MS+1)=48ANDPEEK(MS+2)=48THEN1330
1320 GOTO1310
1330 X$=STR$(SP(I)+100000)
1340 FORZZ=0TO2:POKEMS+ZZ,ASC(MID$(X$,5+ZZ,1)):NEXT
1350 IFI<>1000THEN1370
1360 MS=MS+4:FORZZ=0TO2:POKEMS+ZZ,ASC(MID$("-99",1+ZZ,1)):NEXT:GOTO1390
1370 MS=MS+1:IFPEEK(MS)=48ANDPEEK(MS+1)=48ANDPEEK(MS+2)=48THEN1390
1380 GOTO1370
1390 NEXT
1400 END
1410 PRINT"■":FORI=32768TO32807:POKEI,224:POKEI+960,224:NEXT
1420 FORI=32808TO33688STEP40:POKEI,224:POKEI+39,224:NEXT
1430 PRINT"■■■■■"
1440 PRINTTAB(9)"  ▛▀ ▌    ▙"
1450 PRINTTAB(9)"  ▙▄▌▌▌▌▌▌▟▌▌▌▌▟"
1460 PRINT"■■■■■■■■■■■"TAB(13)"■SCREENSAVER"
1470 PRINT"■■■■■■■■■■■■■■■"TAB(25)"ANDY GAMBLE"
1480 GOSUB1630
1490 GOTO830
1500 PRINT"■■■THIS PROGRAM ENABLES YOU TO DRAW"
1510 PRINT"DIAGRAMS ON THE SCREEN AND SAVE THEM IN"
1520 PRINT"DATA STATEMENTS."
1530 PRINT"■WHEN DRAWING ON THE SCREEN, THE CURSOR"
1540 PRINT"IS A FLASHING ▒, AND ALL THE CURSOR"
1550 PRINT"CONTROLS WORK EXCEPT INSERT AND DELETE."
1560 PRINT"ALL KEYS ALSO REPEAT."
1570 PRINT"■WHEN YOUR SCREEN IS FINISHED, PRESS"
1580 PRINT"SHIFT-RETURN TO SAVE IT."
1590 PRINT"■DELETE ALL THE PROGRAM FROM LINE 770,"
1600 PRINT"AND READ BACK THE VALUES FROM THE DATA"
1610 PRINT"STATEMENTS IN A NEW PROGRAM.■■■"
1620 GOSUB1630:GOTO870
1630 PRINT"■■■■■■"TAB(8)"■PRESS ANY KEY TO CONTINUE"
1640 GETZZ$:IFZZ$=""THEN1640
1650 RETURN
```

Listing 2.

```
1000 REM BACK-TO-SCREEN'
1010 HM=32768
1020 READZA:IFZA=-99THEN9999
1030 IFZA>300THENFORZI=HMTOHM+ZA-300:POKEZI,32:NEXT:HM=ZI-1:GOTO1020
1040 POKEHM,ZA:HM=HM+1:GOTO1020
9999 REM PROG CONTINUES
```

Listing 3.

```
100 DATA475,100,100,100,100,100,100,333,233,160,105,301,233,160,105
110 DATA332,233,160,105,301,100,100,100,100,100,100,329,233,160,105
120 DATA301,233,160,105,301,233,160,105,329,099,099,099,233,160,105
130 DATA301,100,100,100,100,100,100,329,233,160,105,301,233,160,105
140 DATA301,233,160,105,329,099,099,099,233,160,105,301,100,100,100
150 DATA100,100,100,329,233,160,105,301,233,160,105,301,233,160,105
160 DATA329,099,099,099,233,160,105,336,233,160,105,301,233,160,105
170 DATA333,099,099,099,099,099,099,716,-99
1000 HM=32768
1010 READZA:IFZA=-99THEN9999
1020 IFZA>300THENFORZI=HMTOHM+ZA-300:POKEZI,32:NEXT:HM=ZI-1:GOTO1010
1030 POKEHM,ZA:HM=HM+1:GOTO1010
9999 REM PROG CONTINUES
```

Listing 3 shows the result of running Screensaver and appending the program in Listing 2. It will draw the logo in Figure 1. Notice that the 475 in line 100 and the 716 in line 170 successfully compress large amounts of blank space. □

Simply SOFTWARE

20 - 30% OFF

Educational
Professional
Personal
Recreational

OVER 2000 TITLES
Available For These Systems:

APPLE • TRS-80 • ATARI

COMMODORE • HEATH

IBM • NORTHSTAR • T.I.

OSI • CPM • NEC

SOL-20 • SORCERER

WRITE FOR CATALOG

SIMPLY SOFTWARE, INC.
4207 BELL
KANSAS CITY, MISSOURI 64111

CIRCLE 233 ON READER SERVICE CARD

Save On
TRS-80™ Computers

For the best deals on TRS-80 Computers, we have SPECIAL DISCOUNTS, FREE SHIPPING and a TOLL FREE ORDER NUMBER.

Pan American Electronics

1117 Conway • Mission, TX 78572
Telex Number 767339
Toll Free Order Number 800/531-7466
Texas & Principal Number 512/581-2766
TM - Trademark of Tandy Corporation

CIRCLE 209 ON READER SERVICE CARD

psychology today CASSETTES

PSYCHOLOGY TODAY offers a free catalog which includes a complete up-to-date listing of cassettes available. These tapes feature leading authorities who share their ideas and findings on a wide range of important topics in all areas of the behavioral and social sciences.
To obtain the Psychology Today Cassette catalog, FREE-OF-CHARGE, write to: CASSETTE CATALOG, P.O. Box 278, Pratt Station, Brooklyn, N.Y. 11205.

Verse Weaving: A Challenge for All Ages

Ned J. Davison

Renewal

warm earth and fields
no time to turn
'I know it's over'

'I suppose,' he said
'if the water's dark'
the sky's violent blue
too long
too late

'softly'
'it won't be easy'

and later her dry palms
no time to turn
like a new green leaf
without breath or fear or love

Transition: 3

Renewal

with the graceful line of flight
'please, now!'
the words were brittle
time, time to start again

as the fields rolled in the sunlight
to feel again
under velvet skies
... still it's early
just alloy and circuitry
it's so simple...
'it won't be easy'
while air shifted, sullen, heavy
as the fields rolled in the sunlight

Transition: 4

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

Computer Exchange

ALL MAIL: P.O. Box 1380, Jacksonville, OR 97530

DEALER INQUIRIES INVITED

WAREHOUSE AND OFFICES, BY APPOINTMENT AT 6791 APPLEGATE ROAD.

Ad # 932C

apple supply center

★ STAR INDICATES BEST BUYS

HARDWARE for Apple II/II+

★ Apple II 48K or 64K	CALL	CALL
Disk II W/or W/O controller	CALL	CALL
Apple III 128K	$2950	16%
Apple III Profile 5 Meg H.D.	$2499	30%
Apple Interface Cards	CALL	50%
Silentype	CALL	30%

Direct Substitute for Apple Drives

NEW

Micro-Sci A2 is a direct substitute for Apple II drives. It will run all Apple II software. Save $350 on a dual A2 disk system.

Micro-Sci 5" Drives for Apple II		SAVE
A2 Drive, 5", 143K	$ 395	18%
Controller Card for A2	$ 95	15%
A70 Drive, 5", 286K	$ 489	20%
A40 Drive, 5", 160K	$ 369	18%
Controller Card for A70 or A40	$ 79	21%

MONITORS:

			SAVE
NEC	12" Color	$ 359	24%
	12" Green	$ 169	22%
SANYO:	9" B&W	$ 149	31%
	9" Green	$ 159	31%
	12" B&W	$ 219	30%
	12" Green	$ 229	30%
	13" Color	$ 399	28%
ZENITH	12" Green	$ 119	20%

DISKETTES, 5", box of 10:

Memorex	$ 25	45%
Maxell	$ 39	33%
Dysan	$ 45	20%

80 COLUMN VIDEO CARDS:

Videx Videoterm	$ 249	18%
M&R Sup R Term	$ 295	22%
ALS: Smarterm	$ 269	30%

MISCELLANEOUS:

		SAVE
CCS: Serial Interface 7710A	$ 139	22%
Other CCS Cards In Stock,	CALL	CALL
Hayes: Micromodem II	$ 289	25%
Smartmodem	$ 229	20%
ISC Videostick Paddle	$ 35	23%
Keyboard Company:		
Joystick II	$ 45	10%
Game Paddle	$ 25	17%
Numeric Keypad	$ 119	21%
M&R: RF Modulator	$ 25	27%
SUP R FAN	$ 39	25%
★ Microsoft: Z80 Softcard	$ 279	33%
16K RAM Card	$ 159	20%
Softcard Premium Pack	$ 579	25%
Mountain:		
CPS Multifunction Card	$ 209	13%
Clock/Calendar	$ 195	30%
Novation Applecat Modem	$ 329	16%
Orange Micro Grappler	$ 129	21%
Dan Paymar LCA New rev.	$ 34	33%
Saturn Systems: 32K RAM Card	$ 189	24%
64K RAM Card	$ 359	16%
128K RAM Card	$ 509	15%
SSM AIO Serial/Para. Interface	$ 159	20%
★ ALS: Smarterm 80 Col Card	$ 269	30%
Z-Card (Z-80)	$ 209	22%
Addram 16K Card	$ 119	20%
Synergizer Package	$ 549	27%
★ Videx Videoterm 80 col.	$ 249	28%
Soft Video Switch	$ 25	29%
Enchancer II	$ 99	34%
Full Videx Line, Call		up to 35%

PAPER: Fan Fold, Call for sizes, thickness and prices

LETTER QUALITY PRINTERS:

			SAVE
Qume	Sprint 9 45RO	$ 2195	23%
	Sprint 5 45RO	$ 2395	20%
NEC	3510 RO Serial	$ 1995	20%
TEC	Transtar 140	$ 1495	12%

Olympia (Typewriter/Printer)

ES-100, 18CPS, with full cable and interface to Apple II	$ 1295	24%

PRINTERS:

Epson, See special Epson section at right

Intergral Data		
Prism 132, Color Printer w/Graphics	$1695	16%
Prism 80, Color, ASF, W/Graphics	$1395	19%
445 Tiger W/Graphics & 2K	$ 695	23%
560 Tiger W/Graphics	$1095	22%
Okidata Microline 82A	$ 495	25%

ORDERING INFORMATION:

Minimum order $100. Cashiers Checks and Money Orders welcomed. Personal Checks allow 20 days to clear. Add 3% for shipping, insurance and handling. UPS is standard. Additional 7% for US Postal or APO. Additional 3% for VISA or MC. Include telephone #. No COD. Prices subject to change and type errors. Call to verify. Order desk hours are 8 to 6 PST, 10 to 3 Saturdays.

SOFTWARE on disk for Apple II/II+

		SAVE
Apple Software:		
★ 50% off Apple III Software		50%
The Controller	$ 425	32%
Dow Jones News & Quotes	$ 42	50%
How to!	$ 25	50%
Microcourier	$ 189	24%
Many others	CALL	CALL
Applied Software Technology		
Versa Form	$ 289	26%
Artsci Magic Window	$ 75	25%
Ashton-Tate CP/M		
dBase II for Apple II	$ 495	30%
Beagle Bros. DOS Boss	$ 18	25%
Broderbund Software:		
★ Payroll	$ 269	30%
General Ledger	$ 349	30%
Apple Panic	$ 21	30%
Arcade Machine	$ 32	30%
Red Alert	$ 21	30%
Space Warrior	$ 18	30%
Many Others In Stock	CALL	CALL
Budgeco Raster Blaster	$ 22	27%
Cal. Pacific Ultima	$ 30	25%
Cavalier Computer		
Bug Attack	$ 23	23%
Central Point Software:		
★ Copy II Plus ver. 4	$ 35	10%
Will copy most copy protected software for your backup in 45 seconds! NEW		
Continental Software:		
Home Accountant	$ 56	25%
Home Money Minder	$ 26	25%
Data Most:		
Snack Attack	$ 22	25%
Thief	$ 22	25%
Denver Software		
Financial Partner	$ 185	25%
Epson MX 80 Graphics Dump	$ 9	30%
Edu-Ware Compumath	$ 29	25%
Fox & Geller:		
Quickscreen for dBase II	$ 129	13%
Quickcode for dBase II	$ 259	13%
Hayden: Sargon II (chess)	$ 29	22%
Apple Pie (specify brd.)	$ 99	25%
High Technology		
★ Job Control System	$ 469	40%
Howard Software:		
Tax Preparer 1982 ver.	$ 115	25%
Real Estate Analyzer	$ 149	25%
Creative Financing	$ 149	25%

		SAVE
Infocom Zork II	$ 29	30%
Info Unlimited		
Easywriter (PRO)	$ 139	25%
Innovative		
★ Apple Spellguard CP/M	$ 150	50%
Insoft:		
Electric Duet NEW	$ 25	20%
ALD System II or III	$ 110	10%
TransFORTH II or III	$ 110	10%
★ Insoft Accountant CP/M	$ 355	66%
GraFORTH NEW!	$ 69	25%
ISA Spellguard	$ 219	25%
Lighting Software Mastertype	$ 29	25%
LJK Letter Perfect	$ 112	25%
Micro Lab:		
Data Factory, ver. 5.0	$ 249	20%
Invoice Factory	$ 129	35%
Tax Manager	$ 95	38%
Micro Pro all CP/M		
★ Word Star	$ 239	36%
Mail Merger	$ 79	36%
Spell Star	$ 159	36%
Data Star	$ 189	36%
Calc Star	$ 189	36%
Super Sort	$ 129	36%
Microsoft:		
A.L.D.S.	$ 110	10%
BASIC Compiler	$ 299	25%
Cobol 80	$ 559	25%
Fortran 80	$ 149	25%
Olympic Decathlon	$ 24	24%
TASC Compiler	$ 159	22%
Typing Tutor II	$ 19	30%
Muse:		
Super Text II	$ 113	25%
Castle Wolfenstein	$ 23	25%
Robot War	$ 29	25%
Omega Microware		
Locksmith Rev 4.0	$ 75	25%
On-Line:		
Expediter II		
Superscribe II	$ 95	27%
Lisa 2.5	$ 59	26%
Pegasus II	$ 22	25%
Threshold	$ 30	25%
Cranston Manor	$ 26	25%
Mission Astroid	$ 15	25%
Mystery House	$ 19	25%
Softporn	$ 22	25%
Ulysess	$ 22	25%

		SAVE
Osborne/C.P. Soft. (Disk and Book)		
★ Some Common Basic Programs, 75 Business, Statistics and Math programs for the Apple II	$ 49	50%
Peachtree Software all CP/M		
Magic Wand	$ 250	37%
GL, AR, AP, PR or Inv	$ 189	38%
Personal Software/VisiCorp:		SAVE
VisiCalc 3.3	$ 189	25%
VisiDex	$ 199	25%
VisiFile	$ 199	25%
Desktop Plan II	$ 199	25%
VisiPlot	$ 159	20%
Desktop Plan III	$ 199	35%
VisiSchedule	$ 239	20%
VisiTrend and VisiPlot	$ 239	20%
VisiTerm	$ 79	20%
Zork	$ 33	20%
Sof/Sys Inc.		
Executive Secretary-WP	$ 189	25%
Softech Int'l:		
★ Stockfile	$ 250	60%
Stockseller	$ 423	30%
Software Publishing:		
PFS II or III	$ 69	26%
Report II or III	$ 69	26%
Sorcim Supercalc	$ 219	25%
Southwestern Data		
ASCII Express	$ 59	25%
Stoneware:		
DB Master (new version)	$ 179	22%
DB Utility	$ 75	10%
Sub Logic Flight Simulator	$ 28	20%
Tymac Super Pix	$ 20	20%

OTHER BRANDS IN STOCK:

Accent, Adventure International, Astar, Auto. Sim., Avalon, Avant-Garde, Beagle, CPU. Datasoft, Delta, Edu-Ware, Info Com, Lazer, LJK, Phoenix, Quality, Sensible, Sentient, Sirius, Strategic, Synergistic and United.

CP/M Software 8" and 5"

All **Ashton-Tate, Insoft, Micro Pro,** and **Peachtree CP/M** software available for most 5" and 8" drives, and computers at similar discounts.

IBM® 3101-10 Terminal — CLOSEOUT $ 995 SAVE 30%

commodore Home Computer — VIC-20 $ 249 16%

INTERTEC DATA SYSTEMS — SUPERBRAIN 64K QD — While They Last $ 2595 36%

HEWLETT PACKARD H/P 85A ★ $ 1,995

		SAVE
H/P 85 Microcomputer/Moniter/Printer	$1995	27%
H/P 87 CP/M Microcomputer NEW!	$1995	20%
H/P 125 CP/M Microcomputer NEW!	$1995	27%
H/P 82901M 5" Dual Drives	$1650	27%
H/P 7225B Professional Graphics Plotter	$2060	25%
H/P 7470A Graphics Plotter	$1249	19%
H/P 41C Calculator	$ 185	25%
H/P 41CV Calculator 2.2K	$ 245	25%
Full Accessories and Software Line	CALL	CALL

EPSON PRINTERS

		SAVE
MX80	$ 449	31%
MX80 F/T	$ 555	25%
MX100 F/T w/graphics	$ 729	27%
70/80/100 Apple Interface and Cable	$ 95	15%
MX80 Friction feed adapter	$ 59	22%
MX80 Graftrax Chip	$ 79	20%

Corvus

6 Meg Hard Disk	$ 2250	39%
11 Meg Hard Disk	$ 3950	25%
20 Meg Hard Disk	$ 4775	25%
Apple Interface	$ 179	40%
Other Interfaces, Omni-Net, Constellation, Mirror, All In Stock		

ATARI®

		SAVE
800 16K	$ 666	17%
400 16K	$ 333	26%
Microtek 16K RAM	$ 75	25%
Microtek 32K RAM	$ 149	25%
410 Recorder	$ 79	17%
810 Disk Drive	$ 449	26%
850 Interface	$ 169	25%
Other Hardware		20 to 30%
Full Line of Software		25%
Visicalc	$ 159	21%
Pac Man Avail 5/82	$ 34	25%
Communicator Kit	$ 345	25%
Educator Kit	$ 129	27%

NEC

Microcomputer		SAVE
8001 32K Computer	$ 750	25%
286K Total Dual Drive PC8031	$ 750	25%
32K addon and I/O Unit PC8012	$ 495	24%
Ren Tec "The Wedge" 32K	$ 495	17%
8023 Impact Printer F/T	$ 595	25%
Impact Printer Cable	$ 49	25%
3510 Letter Qual. Printer	$ 1995	20%
NEC PC Software	CALL	CALL

NEW

FRANKLIN COMPUTER CORPORATION

Ace 100 Features

- Apple II+ Software Compatiable
- Apple II+ Hardware Compatiable
- 64K of RAM
- Built-in 12 Key Numeric Pad
- Upper/Lower Case
- 50 Watt Power Supply

ACE 100

$1195

Note: The Ace 100 has all the features of the Apple II+ plus the last four features listed above, but no color.

VISA master charge

NO SALES TAX

Call for references.

Apple is a registered trademark of Apple Computer, Inc.

Oregon Order Desk (503) 772-3803

TOLL FREE NATIONAL ORDER DESK (800)547-1289

Ad # 932C

CIRCLE 126 ON READER SERVICE CARD

Verse Weaving, continued...

Here's a game for the Atari that everyone can play. All you need is a little imagination and the time to retype some data statements. The program itself is so simple that I hesitated for some time to pass it on. But the technical simplicity of the code doesn't necessarily mean that the program lacks challenge.

The idea is a straightforward one and not particularly new. Randomly selecting lines of verse from a set of data statements, the program displays a poem on the screen. It generates ten variations in 17-line units. You can begin your experimentation with the lines already in the program and then go on to alter words and phrases until you are ready to replace all of the data with your own lines of verse, dialog, or story material.

Initially the screen displays will seem to be ten separate poems, good or bad. After you run the program a time or two, you'll find out that, in fact, what is generated is not ten poems but one much longer poem, expressed in terms of ten variations on the dominant situation or theme. This means that the program does not simply randomly produce verses that result accidentally in one or two tolerable poems out of the total ten.

The verse generated is actually dynamic and changing, and the real product is a theoretically endless statement of repeated variation and mutation. The theme is constant, but the interpretation or emphasis fluctuates, shifts and cycles, but always with slight variations of nuance and implication.

The greater the number of lines in the data set, the greater the variety of each version and the more unlikely it is that two displays will be identical. Increasing the set, however, makes the coherence of theme much more difficult to control.

This variety and impermanence offer a new kind of verse, fiction, or dialog that is constantly changing and elusive.

My own experiments with this almost embarrassingly simple drive program (it could easily be made much more varied and complex with added branching) has led me to realize that as one reads the consecutive units as they are displayed on the screen there comes about a kind of immersion in the lines themselves. Their repetition and repatterning, cycling on and on, tends to create the illusion of the evolution of a work much more expansive in scope than the finite data set would ever suggest by itself.

I arbitrarily generate ten displays before the program terminates. You can extend the number of versions easily so that the series will not be broken by having to re-run the program to continue. Until fatigue sets in, immersion is intensified significantly by longer unbroken sequences. Just increase the FOR loop in line 9, from 10 to whatever number you wish.

Ned Davison, 1373 Butler Ave., Salt Lake City, UT 84102.

Suggestions for Use

You might begin by changing a few words or lines in the data set listed here, and from what you discover, then write your own set of lines. When you do this, it might be easier to begin with only a few, say 20 to 30, and add others as the theme begins to define itself and require new tones and nuances.

You will quickly discover that the "poem" will grow as you experiment, and you may well end up with something very different from what you originally had in mind. This doesn't mean that the result is merely an accident. What happens is that you gradually uncover your own feelings about the subject or theme.

When you make up your lines you can't just rely on chance. There are certain principles that you should probably follow. First, you have to have some basic emotion or theme in mind—for example, "young love," a "lost love," "loneliness, the "joy of living," and so on.

A celebrative theme might be especially fun for the kids—the sights and sounds of Christmas, a birthday or anniversary, "school's out," the fourth of July, etc. As a guide to the kinds of moods that are easiest to work with, listen to popular songs and note the sorts of feelings about which they sing.

The verse generated is dynamic and changing.

Next, you probably should include lines that cover at least the following types of things:

- A place. Some sense of location or setting is needed.
- People or animals. There must be "characters" that do things. To begin, it is usually best to use only a few.
- Actions. Happenings, small precise things—the turn of a head, a gesture, along with an event or episode of some kind, an encounter, a farewell, etc.
- A time. Time is very flexible and expansive and may present problems at first. It helps to think of time as a "time of day," a "time of life," or "moments." Time is best handled initially with open lines that begin or end with words like "before," "after," "later," and other adverbs. The time of day is important and can be suggested with the movement of the sun, light and dark.

In developing lines to cover these things it is very important to *focus on details*. For example, when expressing "place," you might try things like "blades of grass," "grains of sand," "a golden leaf," (to express both time of year and place), or "window pane." With regard to people, things like "fingers," "eyelids," and "lips." In the case of "actions" it is usually effective to include precise gestures that suggest attitudes or moods, a "sudden glance," "her hand fell slowly," and so on.

```
          Renewal

while air shifted, sullen, heavy
      it's over
no time to turn
         time, time to start again
  they know
too far
and later her dry palms
  'if the water's dark'
   shallow trails, shadows
 and she turned away


   shallow trails, shadows
      softly, softly
         time, time to start again
   ... still it's early
                  'please, now!'

                Transition: 5
```

```
          Renewal

                'softly'
      forever dusk, always
  they know
as if gliding down
         it's so simple...
    like a new green leaf
    to feel again
                    'please, now!'
  they know
just alloy and circuitry
as if gliding down

  'if the water's dark'
as if gliding down

always the clock and pen
   shallow trails, shadows

                Transition: 6
```

```
          Renewal

as if gliding down
   grasses  glistening
and later her dry palms
     with the graceful line of flight
    to feel again
         'it won't be easy'

  when we're there
under velvet skies

      forever dusk, always
  too long
  when we're there

       ...and it was
as if gliding down

                Transition: 7
```

Bill Budge's

Raster Blaster

Real pinball flippers make this a game of strategy & skilled shot making.

Animated shields can shoot a lost ball back into play.

Raster Blaster for the Atari 800 and Apple II may be the first personal computer game that is copied for the arcade machines. It is so technically sophisticated and fun to play that it is sure to attract the big arcade manufacturers. But you can get it right now for your Apple or Atari!

Three animated claws trap the ball if they are enabled. When three balls become trapped, all are released for exciting multi-ball play.

Three sets of targets test your aim and timing. Hit all of them to enable the claws.

Plus kickers, thumper-bumpers and an animated **spinner** help to provide unmatched realism.

Dealer inquiries invited
BudgeCo, 428 Pala Ave.
Piedmont, CA 94611
(415)658-8141

VIDEO PINBALL FOR THE APPLE II & ATARI 800

Apple II is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari, Inc.

© BudgeCo 1982

CIRCLE 115 ON READER SERVICE CARD

SAVE $$ **DISCOUNT PRICES** SAVE $$

apple computer

APPLE COMPUTER SYSTEMS SOLD ONLY IN STORE. CALL FOR PRICES.

RAM MEMORY
FOR TRS-80, APPLE II
16K SET 4116's (200 NS) 24.95

General Information:
We carry a large selection of hardware and software by other companies. Send for our catalog.
We are an authorized repair center for **APPLE, ATARI, NORTH STAR, AND EPSON.**

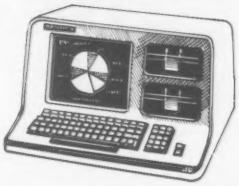
ATARI

400 16K	349.00
800 16K	699.00
410 Recorder	89.00
810 Disk	449.00
822 Printer	359.00
825 Printer	779.00
830 Modem	159.00
850 Interface Module	179.00
CX853 RAM	89.00
CX70 Light Pen	64.00
CX30 Paddle	18.00
CX40 Joystick	18.00

VERBATIM DISKETTES

Box of 10 5¼"	29.50
Box of 10 8"	39.50

NorthStar™



ADV-2Q-64K	3150.00
ADV-1Q-64K-HD-5	5195.00

HRZ-2Q-64K	2795.00
HRZ-1Q-64K-HD-5	4695.00
HRZ-1Q-64K-HD-18	6295.00
5 MB HARD DISK	2350.00
18 MB HARD DISK	4195.00

PRINTERS

EPSON	
MX-70	299.00
MX-80	469.00
MX-80 F/T	569.00
GRAFTRAX	90.00
INTERFACE (APPLE)	75.00
CABLE (APPLE)	22.50
IDS	
560G	1450.00
PRISM	1795.00
NEC	
3510 35CPS	1995.00
7710 55CPA	2650.00
8023A	599.00
OKIDATA	
MICROLINE 80	389.00
MICROLINE 82A	549.00
MICROLINE 83A	849.00
MICROLINE 84	1245.00
C.I.T.O.H.	
STARWRITER 25CPS	1595.00
STARWRITER 45CPS	2195.00
FORMS TRACTOR	275.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. MARYLAND RESIDENTS ADD 5% SALES TAX

FREDERICK COMPUTER PRODUCTS, INC.

TO ORDER CALL:
(301) 694-8884

5726 INDUSTRY LANE FREDERICK, MD. 21701

Store Hours:
MON. THRU THURS. 9:30 AM-9:00 PM
FRI. AND SAT. 9:30 AM-5:00 PM

CIRCLE 160 ON READER SERVICE CARD

Verse Weaving, continued...

Spoken words, fragments of speech and dialog are also very important, adding dramatic intensity and defining emotions.

Finally, there is the question of the number of lines desirable in a data set. This program has 48, of which 17 are selected for each screen display. You will notice that eight of those 48 are simply print statements that produce a blank line.

A celebrative theme might be especially fun for the kids.

Remember that space itself communicates meaning, sometimes in a very powerful way. It regulates pace and modulates the rhythm and flow of the images; so empty lines and indentation are important to your texts.

You will want to experiment with spacing since it can be one of your most powerful tools.

Punctuation is also very significant. Avoid commas, periods, and such, at the end of your lines so they can blend into those that surround them, giving the emotion or mood clearer definition, direction, and intensity.

The Drive Program

Lines 1-6 generate a colorful graphics title. These may be omitted. The string "XC$" dimensioned in 6 is for the screen-printer routine, as is all of line 7.

The print routine itself is contained in lines 500-570 and is for my serial Diablo printer. You can make the appropriate changes for your printer or omit the routine, string "XC$," and line 7. One virtue of this simple program is that, with the print routine removed, it can still be run with only a cassette drive.

Since the program is very short, it can be loaded and saved quickly. If you delete these elements you can revise line 63 to read: IF PEEK(53279)=6 THEN GOTO 65. This will then enable you to use the Start bar to cycle to the next screen display, if you wish, before the timing cycle terminates automatically.

The instructions in line 7 should then be changed to read: "TO GO DIRECTLY TO NEXT VERSION, PRESS". Statements 208 and 220 which show "PRINT" contain escape/control down-arrows to enhance formatting of the closing screen display. These can be set to your own liking. The symbol " " in 65, 205, and 215 indicates the "clear screen" command (escape/control and Clear). The title words "VERSE" in 5, and "WEAVING" in 6 are in inverse characters which produce dark blue letters.

Happy weaving! □

```
            Renewal

     with the graceful line of flight
    like a new green leaf
      softly, softly

         the words were brittle
        time, time to start again
 'I know it's over'
   ... still it's early
 'I know it's over'

and later her dry palms
without breath or fear or love

      too late
        it's so simple...
           'softly'

                Transition: 8
```

```
            Renewal

  when we're there
       'but there's always spring'
 and she turned away
   warm earth and fields
  they know
 the sky's violent blue
   grasses  glistening
  when we're there

always the clock and pen
      it's over
   shallow trails, shadows
just alloy and circuitry
      softly, softly
    'I suppose,' he said
...with little care or gesture
      softly, softly

                Transition: 10
```

```
1 GRAPHICS 2:REM POETIC VARIATIONS. 8/17/81
2 ? :? "              'Renewal'"
3 ? "                        by N.J.Davison"
4 X=7:Y=3:POSITION X,Y
5 ? #6;"VERSE":POSITION X-2,Y+2
6 ? #6;" WEAVING":FOR I=0 TO 3000:NEXT I:GRAPHICS 0:DIM XC$(39)
7 OPEN #3,4,0,"S:":? " TO PRINT CONTENTS OF SCREEN, PRESS"
8 ? "          THE 'START' BAR":? :FOR H=0 TO 900:NEXT H
9 FOR H=1 TO 10:? :? :? "              Renewal":? :A=0:L=0
10 REM SET "RND" TO ONE MORE THAN NUMBER OF VERSES
12 L=INT(49*RND(1)+100)
14 IF L=L2 THEN GOTO 10
20 L2=L
45 A=A+1
47 IF A>17 THEN 60
50 GOTO L
60 PRINT :T=T+1
61 PRINT "                    Transition: ";T
62 FOR I=0 TO 7500
63 IF PEEK(53279)=6 THEN GOSUB 500:GOTO 65
64 NEXT I
65 ? "}"
67 NEXT H:GOTO 210
100 PRINT "          ...and it was":GOTO 10
101 PRINT "without breath or fear or love":GOTO 10
102 PRINT "  they know ":GOTO 10
103 PRINT "    'I suppose,' he said":GOTO 10
104 PRINT "as if gliding down":GOTO 10
105 PRINT "while air shifted, sullen, heavy":GOTO 10
106 PRINT "under velvet skies":GOTO 10
107 PRINT :GOTO 10
108 PRINT :GOTO 10
109 PRINT "too far":GOTO 10
110 PRINT "    too long":GOTO 10
111 PRINT "       too late":GOTO 10
112 PRINT "    ... still it's early":GOTO 10
113 PRINT "    grasses  glistening":GOTO 10
114 PRINT "    warm earth and fields":GOTO 10
115 PRINT "    shallow trails, shadows":GOTO 10
116 PRINT "always the clock and pen":GOTO 10
117 PRINT "just alloy and circuitry":GOTO 10
118 PRINT "no time to turn":GOTO 10
119 PRINT "          time, time to start again":GOTO 10
120 PRINT "     to feel again":GOTO 10
121 PRINT "  (the air, moist--skin, cool)":GOTO 10
122 PRINT "and later her dry palms":GOTO 10
123 PRINT "       forever dusk, always ":GOTO 10
124 PRINT :GOTO 10
125 PRINT "        'but there's always spring'":GOTO 10
126 PRINT "  'if the water's dark'":GOTO 10
127 PRINT "           'it won't be easy'":GOTO 10
128 PRINT " and she turned away":GOTO 10
129 PRINT "as the fields rolled in the sunlight":GOTO 10
```

Verse Weaving: Program Listing

continued overleaf

HUNTINGTON COMPUTING

ADVANCED OPERATING SYSTEMS

#9483	Apple-Aids	$44.89
#9482	Mostly Basic/Household	$26.89
#9481	Mostly Basic/Interface-Scientific	$26.89
#9480	Voyage of the Valkyrie	$35.89

ARTSCI

#6061	Basic Mailer	$59.49
#6060	Magic Window	$84.99
#6062	Magic Words	$62.89

AURORA

#4801	Executive Secretary	$212.49
#4803	Gradebook	$51.00
#4804	Hebrew II	$50.99
#4811	Hebrew II	$79.19
#4805	Quicktrace	$43.99

AVALON HILL

#2058	Major League Baseball	$25.49
#2052	North Atlantic Convoy (Cassette)	$12.69
#2060	Empire of the Overmind (Cassette)	$25.49
#2059	Empire of the Overmind	$29.69
#2061	Tanktics	$24.59

BEAGLE BROS.

#3257	Alpha Plot	$34.69
#3250	Dos Boss 3.3	$20.39
#3255	Dos Boss 3.2	$20.39
#3251	Game Pack #1	$20.39
#3252	Game Pack #2	$20.39
#3253	Game Pack #3	$20.39
#3254	Game Pack #4	$20.39
#3258	Tip Disk	$17.99
#3256	Utility City	$25.89

BLACKBURG

#9160	Active Filter Design	$35.89
#9162	Electronics I	$35.89
#9163	Electronics II	$35.89
#9164	Electronics III	$35.89
#9165	Video Display Graphics	$35.89

BRODERBUND

#1958	Alien Rain	$21.19
#1960	Alien Typhoon	$21.19
#1967	Arcade Machine	$39.49
#1966	David's Midnight Magic	$30.69
#1952	Galactic Empire	$22.99
#1951	Galaxy Wars	$22.99
#2000	Genetic Drift	$25.39
#1957	Golden Mountain	$16.89
#1961	Payroll	$335.69
#1949	Red Alert	$22.99
#1965	Space Quarks	$25.39
#1964	Space Warlord	$21.19
#1956	Tank Command	$12.99
#1955	Tawala's Last Redoubt	$25.39
#1959	Track Attack	$26.89

HARDWARE

#8035	Apple Clock (Mountain)	$246.39
#8200	Applesoft Renumber and Merge in ROM (Soft Control)	$33.89
#8206	Applesoft Utility ROM (Soft Control)	$33.89
#747	B.S.R. Control (Novation)	$16.69
#2107	Basic Compiler (Microsoft)	$335.69
#8205	Basic in ROM (Soft Control)	$33.89
#8039	Blitz Bug (Omni)	$21.89
#8025	C.P.S. Pascal (Mountain)	$16.99
#86	Cable Adaptor (Centronics)	$35.19
#24	Character Set Plus (Lazer)	$22.39
#6534	Cassette Control Device (Hartley)	$67.95
#9043	Data Link (Link)	$87.99
#217	DISASM/65 (Lazer)	$26.29
#2362	Dithertizer II with Camera (Computer Station)	$639.99
#8203	Dual DOS ROMS (Soft Control)	$46.69
#7951	E.Z. Port (Versa)	$21.19
#748	Expansion Mod (Novation)	$33.15
#1476	Game Paddles (TG)	$33.89
#1070	Joyport (Sirius)	$67.39
#12	Joystick (Mimco)	$39.95
#322	Large Character Eprom (Videx)	$34.29
#27	Lower Case Adaptor Rev. 7 (Paymar)	$29.99
#9021	Memory Expansion Module (Prometheus)	$148.69
#8060	Micro-Verter (ATV)	$31.49
#749	Modem Handset (Novation)	$24.65
#6240	Paddle-Adapple (Southern California)	$26.89
#39	560G Paper Tiger (IDS)	$1,225.00
#8020	MX100 Ft. Printer (Epson)	$749.00
#725	Pro Paddle (Rainbow)	$44.89
#35	Ram Card (Microsoft)	$169.00
#16	16K Ram Expansion Board (Andromeda)	$169.00
#325	Soft Switch (Videx)	$25.49
#36	Z-80 Softcard (Microsoft)	$299.00
#860	Super Fan II (R. H. Electronics)	$64.99
#31	Switchplate (Videx)	$17.99
#59	Vision 80 Card (Vista)	$297.49

MICRO LAB

#2253	Crown of Arthain	$29.69
#2250	Doglight	$25.99
#2254	Mad Venture	$21.19
#2259	Palace in Thunderland	$21.19
#2263	Roach Hotel	$30.69

Softlights

By Fred Huntington

THREE-YEAR OLD ATARI COMPUTER USERS BIRTHDAY SALE

Last year, on my daughter Melody's second birthday, we ran a special on Hodge Podge, the great Apple game for preschoolers. This year, we're very happy because Artworks has come out with a version of Hodge Podge for the Atari. My daughter, Melody, has gone ape over it.

Melody doesn't hover around the Apple at home now, just the Atari, because she wants to play Hodge Podge. Whenever she presses a letter, something happens. For example, if she presses "B" a banjo appears and plays music. There is some action for every key on the keyboard.

The graphices are tremendous and the music is great. There is one major flaw, however. Everytime I get near the Atari, I can't play my games. Melody wants to play Hodge Podge.

So, if you have a child between two and six, get them Hodge Podge and be a hero. And, to help celebrate Melody's third birthday, if you say "Happy Birthday, Melody," you can have it for **$15.94** instead of the $19.95 list price. Even at full list price, I believe Hodge Podge to be one of the best bargains available today (We'll even give you the Apple version for $15.99.)

IBM SOFTWARE

We're now concentrating all our efforts on carrying software for the Apple, Atari, and IBM computers. New for the IBM PC are The Programmer and Las Vegas Black Jack and Word Star. We'll be having more and more IBM PC software. If it's available, we'll try to carry it.

GRAPHICS PRINTER - UNDER $350

We're carrying a great new line of printers – Axiom. Their smallest printer is a knockout. It uses regular computer paper, does fine graphics, comes complete with card and cable and is being sold by us for only $349 plus shipping.

The only disadvantage we can honestly find is that it is only about half as fast as an Epson. But at that price, who needs speed?

MISCELLANEOUS

#2182	Adventure in Time (Phoenix)	$25.39
#2301	Apple World (USA)	$52.99
#7890	Applecillin (XPS)	$33.89
#3700	Asteroid Field (Cavalier)	$22.49
#2700	Astroscope (AGS)	$26.49
#2180	Birth of the Phoenix (Phoenix)	$35.89
#2407	Bishop's Square (Datasoft)	$25.39
#1601	Bloody Murder (Stoneware)	$17.99
#3000	Bookkeeper (Delta)	$76.39
#3702	Bug Attack (Cavalier)	$26.29
#9700	Castles of Darkness (Logical)	$30.69
#3001	Checkwriter (Delta)	$33.99
#9860	Chinese Lessons (CTI)	$26.09
#7851	Cosmo-Mission (Cosmos)	$21.19
#9241	The Count (Pear)	$22.39
#2752	Creative Financing (Howardsoft)	$127.49
#2205	Creature Venture (Highland)	$21.19
#4401	Cyborg (Sentient)	$28.99
#1607	D.B. Master Version 3 (Stoneware)	$194.59
#4250	Falcons (Piccadilly)	$25.39
#7878	Financial Partner (Denver)	$220.49
#6080	Firebird (Gebelli)	$25.39
#3954	Form Letter (S. Sorcery)	$26.99
#7852	Hungry Boy (Cosmos)	$21.19
#3451	Interlude (Syntonic)	$16.99
#9840	Jabbertalky (Mind Toys)	$26.29
#3150	The Landlord (Min Micro)	$649.99
#9242	The Liberator (Pear)	$26.89
#2406	Lisp Interpreter (Datasoft)	$106.19
#3953	Mailing List (S. Sorcery)	$44.89
#9240	The Manipulator (Pear)	$31.39
#4552	Market Analyzer (RTR Software)	$224.99
#4550	Market Charter (RTR Software)	$110.39
#9100	Memory Page Editor (Compu-tron)	$44.89
#9580	The Menu (C & H Video)	$26.29
#9380	Menu Generator (Crane)	$35.09
#1804	Monty Plays Monopoly (Visicorp)	$31.99
#2211	Mummy's Curse (Highland)	$26.39
#2200	Oldorf's Revenge (Highland)	$16.89
#4400	OO-Topos (Sentient)	$27.99
#7870	Pascal Programmer (Denver)	$105.99
#7871	Pascal Tutor (Denver)	$105.99
#7650	Pornopoly (CCI)	$25.39
#3484	Pot of Gold I (Rainbow)	$33.89
#3485	Pot of Gold II (Rainbow)	$33.89
#2751	Real Estate Analyzer (Howardsoft)	$127.49
#6600	Rubik's Cube (Software Alternative)	$16.89
#6081	Russki Duck (Gebelli)	$31.39
#1150	Sargon II (Hayden)	$29.79
#2701	Sexoscope (AGS)	$26.49
#8901	Snack Attack (Datamost)	$25.39
#8520	Solitaire (Computek)	$25.39
#2302	Space Raiders (USA)	$25.39
#2306	Star Dance (USA)	$31.89
#3701	Star Thief (Cavalier)	$25.39
#7163	Star Venture (Compu-Thing)	$26.89
#9180	Starship Commander (Voyager)	$35.89
#4251	Suicide (Piccadilly)	$26.29
#3955	Text Editor (S. Sorcery)	$58.39
#8901	Thief (Datamost)	$25.39
#7853	Thunderbirds - GX (Cosmos)	$21.19
#7102	Trickshot (IDSI)	$35.09
#1606	Utility Pak #1 (Stoneware)	$21.19
#4100	Visicalc (Data S.C.)	$29.69
#1820	VisiCalc 3.3 (Visicorp)	$199.00
#1805	VisiFile (Visicorp)	$212.49
#9740	Vocanoes (Earthware)	$43.49
#2181	Zoom Grafix (Phoenix)	$35.89
#7880	Zork I (Infocom)	$33.89
#7881	Zork II (Infocom)	$33.99

SIRIUS

#1058	Autobahn	$25.39
#1068	Beer Run	$19.99
#1073	Borg	$26.89
#1074	Computer Foosball	$25.39
#1065	Copts & Robbers	$29.69
#1051	Cyber Strike	$33.89
#1067	Dark Forest	$19.99
#1060	Gamma Goblins	$25.39
#1061	Gorgon	$33.89
#1069	Hadron	$29.69
#1057	Pulsar II	$25.39
#1071	Snake Byte	$25.39
#1064	Sneakers	$25.39
#1056	Space Eggs	$19.99
#1050	Star Cruiser	$20.99
#1072	Twerps	$26.89

SYNERGISTIC

#1220	Adventure to Atlantis	$35.99
#1216	Data Reporter	$186.99
#1202	Dungeon Campaign	$14.79
#1210	Escape from Arcturus	$25.39
#1214	The Linguist	$33.99
#1200	Odyssey	$25.39
#1207	Program Line Editor	$33.99
#1201	Wilderness Campaign	$18.49

Call Toll-Free 800-344-5106 (outside California)

HUNTINGTON COMPUTING
Post Office Box 1297
Corcoran, California 93212

Foreign Orders 209-992-4481
In California 800-692-4146

Apple* is a registered trademark of Apple Computer, Inc.
Pet* is a registered trademark of Commodore.
TRS-80* is a registered trademark of Tandy Corp.
Atari* is a registered trademark of Atari, Inc.

Outside Calif. 800-344-5106

We take **MasterCard, American Express or VISA** (Include card # and expiration date). California residents add 6% tax. Include $2.00 for postage. Foreign and hardware extra. Foreign (excluding Canada): remit U.S. currency, checks on U.S. banks, use listed charge cards, or make direct wire transfers through Security Pacific Bank, Corcoran, for a $6.00 charge. All overseas orders shipped by air. Send for free catalog. Prices subject to change without notice.

Verse Weaving, continued...

```
130 PRINT :GOTO 10
131 PRINT "                    'please, now!'":GOTO 10
132 PRINT "      softly, softly":GOTO 10
133 PRINT "...with little care or gesture":GOTO 10
134 PRINT :GOTO 10
135 PRINT "    like a new green leaf":GOTO 10
136 PRINT :GOTO 10
137 PRINT " the sky's violent blue":GOTO 10
138 PRINT :GOTO 10
139 PRINT "     with the graceful line of flight":GOTO 10
140 PRINT :GOTO 10
141 PRINT "        it's so simple...":GOTO 10
142 PRINT "           'softly'":GOTO 10
143 PRINT "  when we're there":GOTO 10
144 PRINT "            smooth, like sand":GOTO 10
145 PRINT "      it's over":GOTO 10
146 PRINT " 'I know it's over'":GOTO 10
147 PRINT "     'I suppose,' she said":GOTO 10
148 PRINT "          the words were brittle":GOTO 10
150 READ Q$:PRINT Q$
200 REM REMEMBER TO ADD "GOTO 10" TO EACH NEW PRINT LINE
203 REM AND TO INCREASE "RND" IN STATEMENT 10.
205 PRINT "}"
208 PRINT ""
210 PRINT "            END OF SERIES"
213 FOR I=0 TO 300:NEXT I
215 PRINT "}":PRINT "":PRINT "        TO REPEAT, TYPE RUN"
220 PRINT "":END
500 REM TO PRINT CONTENTS OF SCREEN
502 REM (COURTESY OF LEN LINDSAY)
505 XC$="                              "
510 FOR YL=0 TO 22
515 POSITION 1,YL
517 FOR XL=1 TO 39
520 GET #3,XC
530 XC$(XL,XL)=CHR$(XC)
540 NEXT XL
550 OPEN #2,8,0,"R2:"
552 XIO 34,#2,192,0,"R2:"
554 XIO 36,#2,0,4,"R2:"
556 ? #2;XC$
558 CLOSE #2
560 NEXT YL
570 RETURN
```

Computer Poetry: Not So New

David Ahl

Every once in a while I feel compelled to get up on my soap box and wave my hand around a bit and speak out to the legions of programmers and would-be programmers entering the computer field. And what I try to say is "Look back, learn from your predecessors, learn from the pioneers."

Although personal computers have only been with us a few years, minicomputers and mainframes have been around for much longer.

continued overleaf

Poet: Program Listing and Sample Run

```
90 RANDOM
100 IF I<>1 THEN 101 ELSE PRINT "MIDNIGHT DREARY";
101 IF I<>2 THEN 102 ELSE PRINT "FIREY EYES";
102 IF I<>3 THEN 103 ELSE PRINT "BIRD OR FIEND";
103 IF I<>4 THEN 104 ELSE PRINT "THING OF EVIL";
104 IF I<>5 THEN 210 ELSE PRINT "PROPHET";
105 GOTO 210
110 IF I<>1 THEN 111 ELSE PRINT "BEGUILING ME";
111 IF I<>2 THEN 112 ELSE PRINT "THRILLED ME";
112 IF I<>3 THEN 113 ELSE PRINT "STILL SITTING...":GOTO 212
113 IF I<>4 THEN 114 ELSE PRINT "BURNED.   ":GOTO 212
114 IF I<>5 THEN 210 ELSE PRINT "NEVER FLITTING";
115 GOTO 210
120 IF I<>1 THEN 121 ELSE IF U=0 THEN 210 ELSE PRINT "SIGN OF PARTING";
121 IF I<>2 THEN 122 ELSE PRINT "AND MY SOUL";
122 IF I<>3 THEN 123 ELSE PRINT "DARKNESS THERE";
123 IF I<>4 THEN 124 ELSE PRINT "SHALL BE LIFTED";
124 IF I<>5 THEN 210 ELSE PRINT "QUOTH THE RAVEN";
125 GOTO 210
130 IF I<>1 THEN 131 ELSE PRINT "NOTHING MORE";
131 IF I<>2 THEN 132 ELSE PRINT "YET AGAIN";
132 IF I<>3 THEN 133 ELSE PRINT "SLOWLY CREEPING";
133 IF I<>4 THEN 134 ELSE PRINT "...NEVERMORE";
134 IF I<>5 THEN 210 ELSE PRINT "EVERMORE.";
210 IF U=0 THEN 212 ELSE IF RND(0)>.19 THEN 212 ELSE PRINT ",";:U=2
212 IF RND(0)>.65 THEN 214 ELSE PRINT " ";:U=U+1:GOTO 215
214 PRINT:U=0
215 I=INT(5*RND(0)+1)
220 J=J+1:K=K+1
230 IF U>0 THEN 240 ELSE IF INT(J/2)<>J/2 THEN 240 ELSE PRINT "      ";
240 ON J GOTO 100,110,120,130,250
250 J=0:PRINT:IF K>20 THEN 270 ELSE GOTO 215
270 PRINT:U=0:K=0:GOTO 110
999 END
```

```
BIRD OR FIEND
     STILL SITTING...
 DARKNESS THERE SLOWLY CREEPING,

PROPHET,
     BURNED.
 QUOTH THE RAVEN NOTHING MORE
 MIDNIGHT DREARY STILL SITTING...
 SHALL BE LIFTED
     SLOWLY CREEPING

PROPHET
     STILL SITTING...
 SIGN OF PARTING EVERMORE.

MIDNIGHT DREARY BEGUILING ME
AND MY SOUL EVERMORE.

NEVER FLITTING
THING OF EVIL
     STILL SITTING...
 DARKNESS THERE SLOWLY CREEPING
THING OF EVIL BEGUILING ME
     AND MY SOUL ...NEVERMORE

FIREY EYES, NEVER FLITTING
SHALL BE LIFTED
     EVERMORE.
```

TRS-80™ DISCOUNT
PERSONAL COMPUTERS
PRINTERS - SOFTWARE
PURE RADIO SHACK EQUIPMENT
WE CARRY THE FULL
LINE OF **TRS-80's**

MODEL II
26-4002 64K I Drive..... $3098
Ask About Hard Drives
New! Model 16 TRS-80.....CALL

MODEL III
26-1062 16K..... $819
26-1066 48K with
2 Drives, RS232..... $2049

TM - TANDY CORPORATION
FREE COPY OF WARRANTY UPON REQUEST

BUY DIRECT
AT WHOLESALE PRICES
1-800-841-0860

COLOR COMPUTER
26-3001 4K..... $309
26-3002 16K Ext. Basic..... $455
26-3003 32K Ext. Basic..... $569
26-3022 Color Drive # 1..... $498

WRITE FOR FREE CATALOG
MICRO MANAGEMENT SYSTEMS, INC.
Parcel Division
DEPT. NO. 3
Downtown Plaza Shopping Center
115C Second Ave. S.W. • Cairo, Georgia 31728
912-377-7120 Ga. Phone No.

CIRCLE 185 ON READER SERVICE CARD

800-SOFTWARE DECLARES WAR ON CP/M® SOFTWARE PRICES!

	Our Price	Other Discount Sellers	Retail List
MICROPRO™ — wordstar™	239	319	495
calcstar™	249	259	295
mailmerge™	79	109	150
spellstar™	169	189	250
datastar™	249	249	350
supersort™	169	199	250
PERFECT™ — perfect writer™	199*	259	289
perfect speller™	129*	159	189
perfect mailer™	129*	159	189
dBASEII™	495	595	700
SUPERCALC™	199	269	295
SPELLGUARD™	199	239	300

	Our Price	Other Discount Sellers	Retail List
SMARTERM™	49*	159	200
ARTIF INTELL.™ — medical™	595	849	1200
dental™	595	849	1200
VISACCOUNT™	109	179	199
TCS™ — general ledger ™	69*	129	500
accounts payable™	69*	129	500
accounts receivable™	69*	129	500
payroll™	69*	129	500
all four above	249*		
CBASIC™	99	125	200
SELECT™	449	495	595
PICKLES AND TROUT™	169	179	185

TO ORDER CALL TOLL FREE 800-227-4587** VISA-MASTER-AM. EX.

- UNCONDITIONAL GUARANTEE on many products
- FREE CUSTOMER SERVICE HOTLINE 415-974-5990
- RELIABLE UPS BLUE LABEL DELIVERY
- WE SPECIALIZE IN BUSINESS CP/M®

- Call for shipping charges
*Unconditioned 30 day moneyback guarantee
**800-622-0678 in California (Calif. residents add sales tax)

800-SOFTWARE, INC.™
185 Berry St., Suite 6820
San Francisco, California 94107 #2-2

800-SOFTWARE™ HAS THE BEST CP/M® PRICES!

CIRCLE 155 ON READER SERVICE CARD

Saturn Navigator now A2-3D1 licensed!

Yes, SubLOGIC's **A2-3DA Saturn Navigator** is now available as a complete package, incorporating all of the graphic routines necessary for a successful flight from earth to Saturn. If you've been looking for a realistic 3D space flight simulation, this is the one for you. / For the Apple II plus or Apple II with Applesoft ROM. 48K. **$34.95.**

See your dealer!

subLOGIC
Communications Corp.
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482

"Apple" is the registered trademark of Apple Computer Inc.

CIRCLE 248 ON READER SERVICE CARD

Computer Poetry, continued...

While you probably don't want to look over every program ever written in CAL, GATE, or Auto coder, it is probably worthwhile to look over previous efforts in Basic, Fortran and Algol.

Let's take this program, Verse Weaving. Fourteen years ago, a similar program was written at Digital Equipment Corporation, I believe by Jim Bailey, called Poet. The output of the program from Poet is similar to that from Verse Weaving by Ned Davison except that Poet is a considerably simpler program. Poet puts spaces in the printed lines randomly whereas Verse Weaving requires that spaces be inserted when the phrases are entered.

Two years after Poet was written, I took the general frame and modified it to accept user input of the poetic phrases and to print out to either the screen or a line printer. This resulted in the program called "Bard" published in several DEC publications as well as in *Creative Computing* in 1976. For comparison, we have included listings of both Poet and Bard along with Davison's Verse Weaving. Needless to say Poet and Bard cannot be run directly on your Atari, Apple or TRS-80 or whatever. They were written for the RSTS-11 time-sharing using Basic Plus and, thus require some conversion to run in MicroSoft Basic or the Basic available on a personal computer. Nevertheless, the basic concepts are there and may be incorporated into your poetry programs and probably improved upon. *Creative Computing*, Vol. 2, No. 5 had four lists of phrases that made reasonable sounding poetry in the Bard framework. One such list is below.

Davison has some nice ideas and states the case for computer poetry rather well. However, I believe that if you look over the books and periodicals of the sixties and seventies you may be startled by the original material and novel ideas found therein.

3-YEAR-OLD PHRASES

Romper stompers
"Look at me!"
Dancing and singing
Sparkling eyes
Bouncing curls

"Tie my shoes"
"I can do it myself"
Skipping and jumping
Radiating joy
Devilishly spirited
Oh, so lively!
Unbounded energy
Supremely happy
Inquiring, curious
Looking, discovering

Always active
And gumballs
. . . . Delightful
. . . . So lovable
Adventure!

Bard: Program Listing and Sample Run

```
10 REMNANTS OF ANOTHER PROGRAM, POET, APPEAR IN THIS
20 REMARKABLE PROGRAM, BARD, WRITTEN BY DAVID AHL
30 PRINT "BARD WRITES RANDOM POETRY WITH YOUR WORDS OR PHRASES."
40 PRINT "YOU SUPPLY 20 WORDS OR PHRASES UP TO 16 LETTERS LONG."
50 RANDOM: DIM A$(20): FOR I=1 TO 4
60 PRINT: PRINT "FIVE PHRASES FOR LINE"I"PLEASE"
70 FOR J=1 TO 5: S=(I-1)*5+J: INPUT A$(S)
80 IF LEN(A$(S))>16 THEN INPUT "TOO LONG. AGAIN...";A$(S):GOTO 80
90 NEXT J: NEXT I
200 PRINT A$(I);:GOTO 300
210 PRINT A$(I+5);:GOTO 300
220 PRINT A$(I+10);:GOTO 300
230 PRINT A$(I+15);:GOTO 300
300 IF U=0 THEN 310 ELSE IF RND(0)>.19 THEN 310 ELSE PRINT ",";:U=2
310 IF RND(0)>.65 THEN 320 ELSE PRINT " ";:U=U+1:GOTO 330
320 PRINT: U=0
330 I=INT(5*RND(0)+1): J=J+1: K=K+1: L=L+1
340 IF U>0 THEN 350 ELSE IF INT(J/2)<>J/2 THEN 350 ELSE PRINT "      ";
350 ON J GOTO 200,210,220,230,360
360 J=0: PRINT: IF K>20 THEN 370 ELSE GOTO 330
370 PRINT: U=0: K=0: IF L<200 THEN 200
999 END
```

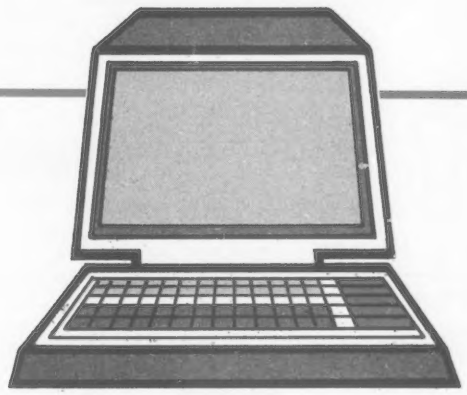
```
>RUN
BARD WRITES RANDOM POETRY WITH YOUR WORDS OR PHRASES.
YOU SUPPLY 20 WORDS OR PHRASES UP TO 16 LETTERS LONG.

FIVE PHRASES FOR LINE 1 PLEASE
? CARPET OF FERNS
? MORNING DEW
? TANG OF DAWN
? SWAYING PINES
? THE SONG OF NATURE
TOO LONG. AGAIN...? SONG OF NATURE

FIVE PHRASES FOR LINE 2 PLEASE
? ENTRANCES ME
? SOOTHING ME
? RUSTLING LEAVES
? GENTLY CARESSES
? RADIATES CALM

FIVE PHRASES FOR LINE 3 PLEASE
? MIGHTY OAKS
? GRACE AND BEAUTY
? SILENTLY SINGING
? NATURE SPEAKING
? CAPTURES MY SENSES
TOO LONG. AGAIN...? SENSUAL

FIVE PHRASES FOR LINE 4 PLEASE
? UNTOUCHED, UNSPOILED
?Extra ignored
? SHADES OF GREEN
? TRANQUILITY
? ...EVERMORE
? SO PEACEFUL...

SONG OF NATURE
     GENTLY CARESSES
NATURE SPEAKING ...EVERMORE

MORNING DEW
     RADIATES CALM
SILENTLY SINGING
     ...EVERMORE
TANG OF DAWN, RUSTLING LEAVES GRACE AND BEAUTY, TRANQUILITY


SONG OF NATURE
TANG OF DAWN RADIATES CALM SENSUAL SHADES OF GREEN

SWAYING PINES
SWAYING PINES SOOTHING ME
MIGHTY OAKS
     TRANQUILITY

MORNING DEW RUSTLING LEAVES SILENTLY SINGING
     SO PEACEFUL...

SWAYING PINES SONG OF NATURE SOOTHING ME,
MIGHTY OAKS
     ...EVERMORE
```

a selection from our current catalog

creative computing

CATALOG

SOFTWARE
PERIPHERALS
BOOKS



Apple is a registered trademark of Apple Computer Inc.
Apple II is a registered trademark of Apple Computer Inc. • **TRS-80** is a registered trademark of Tandy Corp.
• **Sorcerer** is a registered trademark of Exidy Systems. • **Atari** is a registered trademark of Atari Inc.

creative computing Dept. C720 • 39 E. Hanover Ave. • Morris Plains, New Jersey 07950

ORDER FORM

PLEASE SEND THE FOLLOWING:

QUANTITY	ITEM NUMBER	DESCRIPTION	UNIT PRICE	TOTAL PRICE

TOTAL ORDER	$	
NJ RESIDENTS ADD 5% SALES TAX	$	
POSTAGE AND HANDLING	$	
TOTAL	$	

☐ PAYMENT ENCLOSED $_____

☐ CHARGE MY: ☐ American Express ☐ MasterCard ☐ Visa

(Minimum charge order $10)

CARD NO. _____ EXP. DATE _____

SIGNATURE _____

MR./MRS./MS. _____

(please print full name)

ADDRESS _____

CITY/STATE/ZIP _____

For Faster Service Call

TOLL FREE

and charge your order

800-631-8112

(In NJ 201-540-0445)

(Minimum charge order $10)

Postage and Handling Charges:

- SOFTWARE—add $2.00 per order. Foreign orders (except Canada and Mexico) add $5.00 per order—*shipped air mail only.*
- BOOKS AND PERIPHERALS—Postage and handling charge appears in parentheses ( ) following the price of each item.

☐ **YES!** Send me a copy of your complete catalog.

SOFTWARE

TORAX

Apple II

Defend your home planet against the invading Torids! Try to protect your nuclear fuel tanks, which the aliens are intent on stealing. The Torids drop down, steal a fuel tank, and rise up to escape. They are also armed, and will not hesitate to shoot at you. While you whiz by the surface of your planet at incredible speed, you must avoid enemy fire, maneuver your ship, and try to shoot down the Torids without hitting the fuel tanks! (Requires paddles.)

#4520....**Torax Apple II 32K DOS 3.3 Diskette**..... $24.95

STAR CLONES

Apple II

There is unrest in the galaxy. The evil master clone has disrupted life for everybody except for members of the Clone Conspiracy and their evil clone agents. But there is hope. By mastering the four simulations on this disk you can save the galaxy from certain doom. Three skill levels allow you challenging practice for the ten missions that must be accomplished in order to defeat the Master Clone. (Requires Apple II or Apple II Plus, DOS 3.3, and game paddles.)

#4527....**Star Clones Apple II 48K DOS 3.3 Diskette**..... $29.95

SUPER INVASION

Apple Apple II TRS-80 Sorcerer

This is the original arcade game, with superb high resolution graphics, high speed action, nail-biting tension, and hilarious antics by the moon creatures. Fifty-five aliens whiz across the screen, quickening their descent, challenging you to come out from behind your blockades and pick them off with your lasers before they bomb you, destroy your shields, or drop down right on top of you. (TRS-80 version uses low resolution graphics. Apple II version requires paddles and is licensed from Astar International.)

#4006....**Super Invasion Apple 32K Cassette** $19.95
#4505....**Super Invasion Apple II 48K DOS 3.3 Diskette** $19.95
#3020....**Super Invasion TRS-80 32K Cassette** $19.95
#3520....**Super Invasion TRS-80 Model 1 32K Diskette**..... $19.95
#5011....**Super Invasion Sorcerer 8K Cassette** $19.95

BLISTERBALL and MAD BOMBER

Apple II

A frantic, fast-paced romp that can be played for hours, *Blisterball* is the first truly original arcade-type game for a home computer. As the bouncing balls drop from above, you move your laser base and try to shoot them. It's easy at first—with just one ball. Then come two...then three. It gets harder. Four balls come, and finally five. If you survive them, you get to shoot at inelastic bonus balls. If you make it this far, the second round starts. The balls bounce lower, the walls close in! Making superb use of Apple graphics and sound, *Blisterball* can be played by one or two people.

Mad Bomber, included on the same disk, is another fast-paced arcade game. Racks of bombs fill up above you. Whenever four bombs are in any rack, they start to fall. You can shoot them either in the rack or while they're falling, but with racks all across the top of the screen, you need to stay ahead of them to survive! (Requires paddles.)

#4511....**Blisterball/Mad Bomber Apple II 48K DOS 3.3 Diskette** $24.95

SOFTWARE

POOL, SNOOKER and BILLIARDS

Atari

POOL

Old pros and beginners alike will enjoy the challenge and realism of *Pool*. From the satisfying click of a tough combination shot to the accuracy required for a three-cushion bank shot, *Pool* has it all. You control the angle and force of your stroke, then watch the object ball speed toward the pocket. It's so real you can almost feel the felt! *Pool* has a practice mode for one player, 8-Ball and Tournament Pool for two.

SNOOKER

A tough British game using 26 balls requiring the eye of a sharpshooter and the strategy of a chess master. (Not available on cassette.)

BILLIARDS

This captivating British game is played with three balls on a standard pool table. Each player attempts to score by sinking a shot or hitting two balls with his cueball.

#7010....**Pool Atari 16K Cassette** $14.95
#7012....**Billiards Atari 16K Cassette**..... $14.95
#7509....**Pool, Snooker & Billiards Atari 16K Disk** .$24.95

©1981 Thorn EMI Video Programmes Limited
Available only in North America

DARTS and TILT

Atari

DARTS

Walk into the pub, grab a pint of lager and a handful of darts, and try for a bull's eye in this amazing graphic game. One or two players can play, testing their aim at ten skill levels. Whether you want to throw a few, or just show your friends what the Atari computer can do, *Darts* is an ideal addition to your software library. This is Britain's most popular Atari game.

TILT

Remember playing with the wood labyrinth game that tilts in all directions? Now it's on computer! One or two players attempt to navigate balls through a maze and into scoring holes. Nine skill levels and nine speeds.

#7011....**Darts Atari 16K Cassette**..... $14.95
#7013....**Tilt Atari 16K Cassette** $11.95
#7506....**Darts and Tilt Atari 16K Disk** $24.95

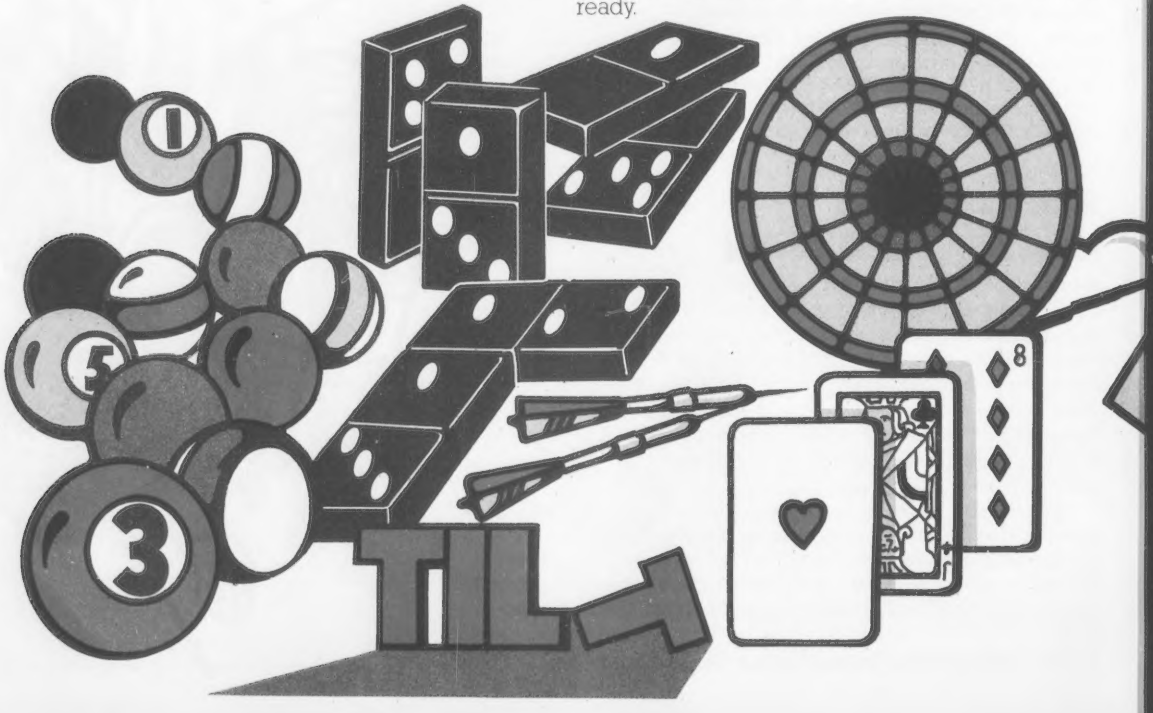
©1981 Thorn EMI Video Programmes Limited
Available in North America only

DOMINOES and CRIBBAGE

Atari

DOMINOES

Take on your computer at a game of draw dominoes. With options for repeating or alternating draw, *Dominoes* gives you a tough opponent who's always ready.



CRIBBAGE

Can you be the first to peg twice around the board? Your computer will put up a tough fight in this head-to-head game of cribbage. A graphic display of board and cards highlights this game of skill.

#7007....**Dominoes Atari 16K Cassette**..... $11.95
#7008....**Cribbage Atari 16K Cassette**..... $11.95
#7507....**Dominoes and Cribbage Atari 24K Diskette**..... $24.95

©1981 Thorn EMI Video Programmes Limited
Available in North America only

MICRO GOLF

Apple II

Your whole family will enjoy playing *Micro Golf*, the new miniature golf simulation. The game includes high-resolution graphics and uses a machine language subroutine to move the ball in a realistic manner. Three different courses are provided, as well as a course editor that allows you to create your own miniature golf courses. One to four players can play, using either the Apple II keyboard or paddles. Requires 48K Apple II with one disk drive, DOS 3.3, and Applesoft in ROM.

#4518....**Micro Golf Apple II 48K Diskette**..... $19.95

ACTION and BUMPING GAMES

Apple II

Six games for action fans. Cross a deadly field in your *Mine Rover.* Hit the ramps and try to make it over the trucks in *Moto Jump.* Race against the clock with the *Road Machine.* Get in shape with *Obstacle Course.* Test your reflexes at *Bumper Blocks* and *Hustle Junior.* Requires Applesoft in ROM or Apple II Plus and game paddles.

#4516....**Action and Bumping Games Apple II 32K DOS 3.3 Disk**..... $24.95

ICBM

TRS-80

TRS-80 version of the popular arcade game where you must destroy incoming missiles with your own anti-ballistic missiles before they destroy your cities with nuclear warheads.

#3521....**ICBM TRS-80 Model I Diskette**..... $19.95
#3021....**ICBM TRS-80 16K Cassette**..... $19.95

SOFTWARE

AIR TRAFFIC CONTROLLER

Atari Sorcerer Apple TRS-80

This fast-moving, real-time game places you in the role of an air traffic controller. You control 26 prop planes and jets as they land, take off, and fly through your airspace. You have a radar map, and give orders to change altitude, maintain a holding pattern, turn, approach, and land at one of two airports.

Written by an air traffic controller, this is a realistic machine language simulation. There are 84 different skill levels, so you won't easily tire of this absorbing simulation.

#5008. . . **Air Traffic Controller Sorcerer 8K Cassette** $11.95
#4008. . . **Air Traffic Controller Apple Cassette** $14.95
#3006. . . **Air Traffic Controller TRS-80 16K Cassette** $14.95

ADVANCED AIR TRAFFIC CONTROLLER

Same as Original Air Traffic Controller, except you have five different airport configurations and radar maps to choose from and added responsibilities such as watching the fuel supply of the planes.

#7004. . . **Advanced ATC Atari 16K Cassette** $14.95
#7503. . . **Advanced ATC Atari 16K Disk** $19.95
#3519. . . **Advanced ATC TRS-80 16K Disk** $19.95
#4517. . . **Advanced ATC Apple 32K DOS 3.3 Diskette** $19.95

MILESTONES

Apple II

Take a colorful, challenging 700-mile journey in this computer version of the French card game loved by millions around the world. Overcome accidents, flat tires, gas shortages, speed limits, and traffic lights to arrive before your opponent. Spectacular high resolution color graphics make this the program to use to demonstrate the abilities of your Apple II. (Requires Applesoft Basic and 48K Apple II.)

#4515. . . **Milestones Apple II 48K DOS 3.3 Diskette** $19.95

TSUNAMI

Apple II

With *Tsunami* you get dozens of superior arcade games rolled into one program. To begin with, wave after wave of alien attackers attempt to overwhelm your defenses. Each wave comes in a different formation and uses different attack and defense strategies. In the first set of games, the attackers are without shields. Next, with shields sheltering them, the attackers can drop bombs right through their shields. . . but you cannot shoot through them. Successive waves use different strategies. Some move from shield to shield, allowing you to shoot while they are in between. Others just come out briefly to attack and you need fast reflexes to get them. Bonus points are awarded for beating the clock, with a countdown timer displayed on the screen. This may be our finest arcade game ever! (Requires paddles).

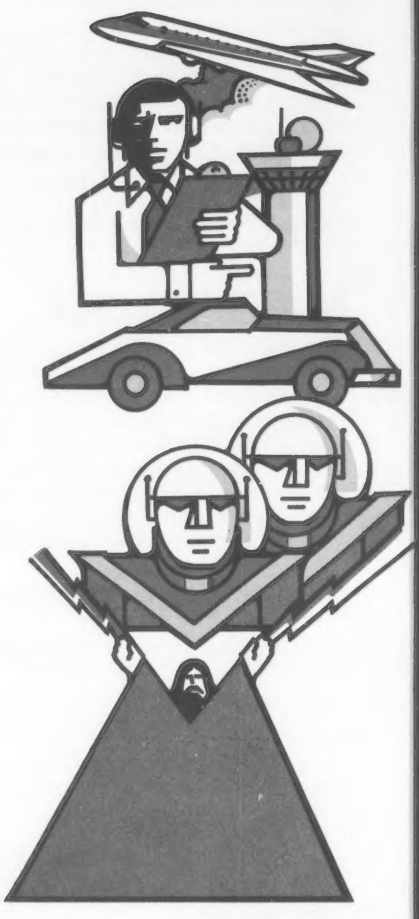
#4526. . . **Tsunami Apple II 48K DOS 3.3 Diskette** $29.95

ORIGINAL ADVENTURE

Atari TRS-80

Somewhere nearby you is a colossal cave where others have found fortunes in treasures and gold, but some who have entered have not been seen again. You start your adventure at a small brick building—the wellhouse for a large spring. You must try to find your way into the underground caverns. . . where you'll meet a giant clam, nasty little dwarves, and much more!

#7504. . . **Original Adventure Atari 40K Disk** $24.95
#7009. . . **Original Adventure Atari 32K Cassette** $19.95
#3518. . . **Original Adventure TRS-80 48K Disk** $19.95



SOFTWARE ORDERING INFORMATION
(IF ORDER FORM IS MISSING)

Send payment (NJ residents add 5% sales tax) plus $2.00 postage and handling (foreign orders—except Canada and Mexico—add $5.00 per order) to Creative Computing, Dept. C720, 39 E. Hanover Avenue, Morris Plains, NJ 07950. Orders may also be charged to your Visa, Mastercard or American Express account—by mail include credit card name, number and expiration date, or, use our toll-free number, 800-631-8112. In NJ only 201-540-0445.

PERIPHERALS

SUPER JOYSTICK

SUPER JOYSTICK

Star Wars. Played with paddles, it's difficult at best and frustrating at worst. But with a joystick, it becomes an entirely new experience.

Drawing with one paddle for horizontal movement and the other for vertical is slow and tedious. But with a joystick, drawing is an absolute joy.

EXCEPTIONAL PRECISION

The Apple high-resolution screen is divided into a matrix of 160 by 280 pixels. To do precise work on this screen, you need a precise device. Most potentiometers used in paddle controls are not quite linear. If you rotate a paddle control at a constant speed, you'll notice that the cursor speeds up slightly at the beginning and end of the paddle rotation.

The Super Joystick has a pure resistive circuit which is absolutely linear within one tenth of one percent. In other words, it would give you precise control over an image of 1000 by 1000 pixels, were such resolution available. Thus it is suitable for high precision professional applications as well as educational and hobbyist ones.

MATCHED TO YOUR APPLICATION

The Super Joystick also has two external trim adjustments, one for each direction. This allows you to perfectly match the unit to your application and computer. If you want to work in a square area instead of the rectangular screen, just reduce the horizontal size with the trim control.

How many times have you played Space Invasion and had your thumb ache for hours from the repeated button pressing? This won't happen with the Super Joystick. Its two pushbuttons are big. Moreover, they use massive contact surfaces with a life of well over 1,000,000 contacts. A few games of Super Invasion using these big buttons will justify the purchase of the Super Joystick.

The Super Joystick is self-centering in both directions. That means when you take your hand off it, the control will return to the center. However, if you want it to stay where you leave it, self-centering may be easily disabled by removing two springs.

The Super Joystick plugs right into the paddle control socket and doesn't require an I/O slot.

HIGH-QUALITY CONSTRUCTION

The sturdy case of the Super Joystick matches that of the Apple computer. Every component used is the very highest quality available. The Super Joystick even uses a full 16-conductor ribbon cable and you can add a second joystick (using our Select-A-Port extension unit for example) if you wish. The first Super Joystick replaces Paddles 0 and 1. You may not realize it, but the Apple has the capacity to support four paddle controls. A second Super Joystick would replace Paddles 2 and 3.

We invite your comparison of the Super Joystick with any other unit available. Order it and use it for 30 days. If you're not completely satisfied, return it for a prompt and courteous refund plus your return postage. You can't lose.

The Super Joystick consists of a self-centering linear joystick, two trim controls, and two pushbuttons mounted in an attractive case. It comes complete with schematics and a 90-day limited warranty.

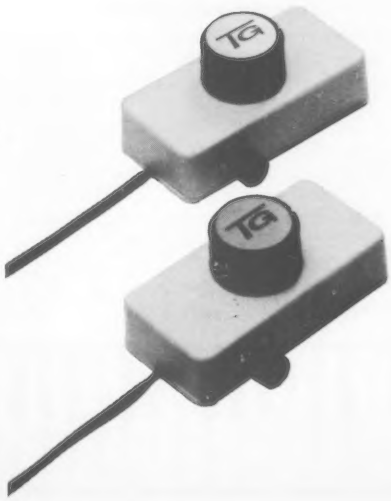
#0013....**Super Joystick**.....$59.95 (P&H $3)

SUPER PADDLES

Are the paddle controllers on your Apple wearing out? Or did you get a new Apple without paddles?

We've got good news for you! Super Paddles. Each paddle control consists of a high-precision linear potentiometer and a big (1/2" D) industrial-quality pushbutton mounted in a sturdy high-impact molded plastic case which matches the Apple. Each of the two paddles is connected with a long 5-foot cable to the Apple paddle socket. Every component in a set of Super Paddles is the very finest quality available. The set is backed by a 90-day limited warranty from the manufacturer as well as our money-back guarantee of satisfaction.

#0012....**Super Paddles**.....$39.95 (P&H $2)



PERIPHERALS ORDERING INFORMATION
(IF ORDER FORM IS MISSING)

Send payment (NJ residents add 5% sales tax) plus postage and handling charges (appears in parenthesis ( ) following the price of each item) to Creative Computing, Dept. C720, 39 E. Hanover Avenue, Morris Plains, NJ 07950. Orders may also be charged to your Visa, Mastercard or American Express account--by mail include credit card name, number and expiration date, or, use our toll-free number 800-631-8112. In NJ only 201-540-0445.

PERIPHERALS

The Most Versatile and Creative Music Peripheral or Instrument You Can Own

SOUNDCHASER™
COMPUTER MUSIC SYSTEMS

The Soundchaser Gives Apple Owners A Chance To Become Musicians
—And Musicians A Reason To Buy Apples

Your Apple Can Be the Heart of a Sophisticated Sound Studio

Would you like real music and total control? The Soundchaser Computer Music System plus an Apple computer produces dazzling results. While a studio synthesizer can cost as much as a small house, Soundchaser gives you a polyphonic synthesizer and multibank sequencer, with features found on most professional systems, for about the same cost as twenty hours of studio time. The system represents a new generation in music, combining computer and synthesizer hardware under the control of sophisticated software. Add a human at the keyboard and you've got a dynamite package.

The keyboard is exceptional. It is a professional, four-octave, 49-note unit housed in a handsome wood cabinet. It looks as good as it sounds. Just as important, it feels right. Installation is simple: the keyboard interface plugs into peripheral slot seven in the Apple. No special wiring or chip changes are required. As soon as you insert the card, the keyboard is ready to talk to the Apple. Add a synthesizer, and you can play live, lay down a sequence, or play over a recorded sequence.

Outstanding Synthesizer Hardware

The Soundchaser Voice Card is a computer controlled, full-feature, dynamic synthesizer. Each card provides three voices. A two-card system with a total of six voices is recommended, but we don't lock you into one product line. Soundchaser can sing just as well with other synthesizers, most notably the Mountain Music System. This board is highly regarded by Passport Designs and by pairing the sixteen channels, they allow the Soundchaser system to produce eight full-bodied voices.

The Software Side of the Story

A system that's hard to use is less than worthless. You want to concentrate on music, not programming. Soundchaser helps you out with intelligent and flexible menu-driven software. A highlight of the software is the Editor. With the aid of graphically displayed envelopes, slides, and switches, you can create a wide range of instrument sounds. Envelopes and oscillator waveforms are drawn right on the screen. There is no better aid for experimentation.

Once you create an instrument sound, it's onto the Sequencer. Here, you can record a sequence of notes, storing them in memory. Later, the sequence can be played back, using a new instrument sound if desired. You can sit back and listen, or play live over the sequence. Instruments and sequences can easily be saved to disk and retrieved all under program control.

Added Support

Passport Designs has already produced a full series of support software to augment Soundchaser. The Notewriter displays your music in standard notation on the hi-res screen, right as you play. It lets you easily write your own lead sheets and fake books. There is no simpler way to produce sheet music, and you can obtain hard copy using virtually any graphics printer. With the Notewriter, you can compose, arrange, and transcribe without having the drudge work get in the way of your creativity.

The Musictutor transforms Soundchaser into a challenging educational tool. The software includes programmed courses in ear training, music theory, and harmony. It can be used both by teachers and by individuals who want to sharpen their musical skills (curriculum outline is available upon request).

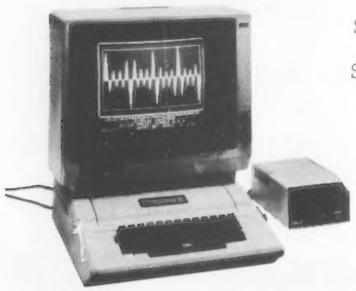
The software will continue to grow, so Soundchaser will never grow obsolete. For those with the interest and desire, the manual includes instructions for accessing the keyboard from user programs.

System Requirements

Apple II or Apple II Plus, 48K, Disk Drive, Paddles, Monitor or Television with RF Modulator (black and white or color), and printer (only required for making hard copy from Notewriter).

Write for free brochure. Dealer inquiries invited.

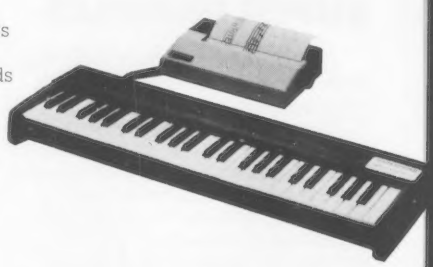
Your system is fully backed by a 90-day manufacturer warranty and a complete money back guarantee of satisfaction (trial period is 30 days).

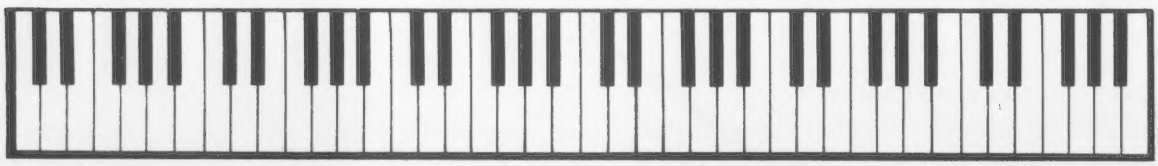


Soundchaser Packages

Soundchaser with Mountain Music System Boards (Eight Voices-Digital) # $1045.00
Soundchaser with Dual 3-Voice Synthesizer Boards (Six Voices-Analog) # $1350.00
Notewriter (1 Disk) # $99.00
Musictutor (3 Disks) # $150.00
Soundchaser Keyboard and Interface without Synthesizers # $650.00

Add shipping and handling charges below: (U.S. and Canada):
Package #1 or 2 ..... $10.00
Software (independently) $2.00
Soundchaser (independently) $6.00





TWO EXTENSION UNITS TO IMPROVE YOUR APPLE II

EZ PORT

EZ Port extends the game I/O port to the outside of your Apple II so you don't have to open the computer to switch from paddles to joystick or other peripherals.

EZ Port is designed to outlast other I/O extenders—and extend the life of your peripherals, too! The secret is in the sockets. Ordinary DIP sockets are not designed to be used over and over—eventually they won't make contact or the pins will snap off. EZ Port uses Zero Insertion Pressure (ZIP) sockets. You plug in the 16-pin connector and throw a small switch which engages the connections within the socket. The only time there is any stress on the 16-pin connector is when the switch is thrown.

Installation is easy. Just plug EZ Port's cable into the game I/O, run the 24" cable to the outside of the computer and stick EZ Port to the side of your computer with its adhesive strip. Now making I/O changes is quick, easy and safe!

#0022....**EZ Port**.....$24.95 (P&H $2)

SELECT A PORT

Select A Port not only extends the game I/O port to the outside of your Apple II, it lets you permanently plug in up to four peripherals simultaneously!

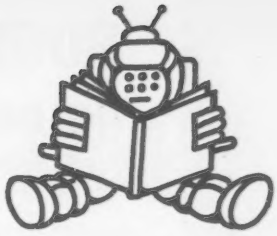
Select A Port consists of five switchable I/O ports. One socket directly parallels the game socket in the Apple, can be used for sensitive devices for which diode isolation would interfere, and has a switch for future expansion where this socket overrides the other four.

With Select A Port you can use two joysticks simultaneously. Because the Apple II can read more than two game controllers (paddles) simultaneously, we cross wired the second I/O port on Select A Port. This port can be reversed to read Paddles 2 and 3. Just plug another joystick into any of the remaining three ports and enjoy dual joystick operation.

The Select A Port is mounted in a 6" x 2¾" x ½" high-impact plastic case. You simply switch on the peripheral to be used and you're ready—without plugging and unplugging delicate 16-pin connectors.

#0023....**Select A Port**.....$59.95 (P&H $2)

BOOKS



CHILDREN'S BOOKS

Computers for Kids

by Sally Greenwood Larsen

This book has 12 chapters with instructions for operating and programming the TRS-80, the Atari, the Apple, or the Sinclair ZX-81. The book is easy to understand and large type makes it easy to read. Children can find out how to put together a flowchart, and how to get a computer to do what they want to do. They learn how to write their own games and draw pictures that move. There's also a section of helpful hints for parents and teachers. The books include detailed lesson ideas and advice on how to fix small problems that might pop up.

#12G....**Computers for Kids/Apple**.....$3.95 (P&H $1)

#12H....**Computers for Kids/TRS-80**.....$3.95 (P&H $1)

#12J....**Computers for Kids/Atari**.....$3.95 (P&H $1)

#12S....**Computers for Kids/Sinclair**.....$3.95 (P&H $1)

Katie and the Computer

Fred D'Ignazio and Stan Gilliam have created a delightful picture book adventure that explains how a computer works to a child. Katie "falls" into the imaginary land of Cybernia inside her Daddy's home computer. Her journey parallels the path of a simple command through the stages of processing in a computer, thus explaining the fundamentals of computer operation to 4 to 10 year olds. Supplemental explanatory information on computers, bytes, hardware and software is contained in the front and back end papers.

Thrill with your children as they join the Flower Bytes on a bobsled race to the CPU. Share Katie's excitement as she encounters the multi-legged and mean Bug who lassoes her plane and spins her into a terrifying loop. Laugh at the madcap race she takes with the Flower Painters by bus to the CRT.

"Towards a higher goal, the book teaches the rewards of absorbing the carefully-written word and anticipating the next page with enthusiasm..."

The Leader

"Children might not suspect at first there's a method to all this madness—a lesson about how computers work. It does its job well."

The Charlotte Observer

"...the book is both entertaining and educational."

Infosystems

Katie and the Computer is hardbound, and illustrated in full color.

#12A....**Katie and the Computer**.....$6.95 (P&H $1.50)

Be a Computer Literate

Marion Ball and Sylvia Charp wrote this introduction to the world of computers for children aged 10-16. Excellent for use as a supplemental textbook in school, it discusses large and small computers, how they are used and their impact on our lives. Simple programming concepts are also introduced. Illustrated in full color, with diagrams and photos on every page. Large format, paperbound. 66 pages with glossary.

#6H....**Be a Computer Literate**.....$3.95 (P&H $1)

GAME BOOKS

Basic Computer Games

A complete anthology of 101 favorite games and simulations, each complete with sample runs, program listings, and description. All games run in standard Microsoft Basic and are easy to use with any computer. There are games just for fun, to develop logic strategies, to teach environmental solutions, to simulate athletic competition, to play alone or with a group. The 101 games offer the kind of challenge, excitement, and delight you want from your computer. Edited by David Ahl and illustrated by George Beker. Large format paperbound, 200 pages.

#6C..**Basic Computer Games** $7.95 (P&H $1.50)

More Basic Computer Games

In this sequel to *Basic Computer Games* there are 84 new games to challenge you. All games are complete with program listings, sample runs, and description. All run in Microsoft Basic and are easy to use with any computer. A Basic conversion table is included.

Talk to Eliza, visit the psychologist, evade a man-eating rabbit, crack a safe, tame a wild horse, become a millionaire, race your Ferrari, joust with a Knight, trek across the desert on your camel, navigate in deep space, hunt a wumpus and much more.

Edited by David Ahl and Steve North, with a preface by Christopher Cerf, illustrated by George Beker. Large format paperbound, 200 pages.

#6C2....**More Basic Computer Games**.....$7.95 (P&H $1.50)

#6C4....**More Basic Computer Games/ TRS-80**.....$7.95 (P&H $1.50)

BOOKS

THE BEST OF...

Best of Creative Computing Volume 1

All the articles, stories, learning activities, games, and puzzles that appeared in *Creative Computing* Volume 1. The contents cover computer applications in education and recreation. Over 200 contributors are represented from college professor to high school student, from U.S. Senator to underground cartoonist, and from corporation president to science fiction author. A must for anyone concerned with the role of and potential for the computer in society. Edited by David Ahl. Large format paperbound, 328 pages.

#6A....**Best of Creative Computing Vol. 1** .....$8.95 (P&H: $2)

Best of Creative Computing Volume 2

336 pages of the best articles, fiction, foolishness, puzzles, programs, games and reviews from *Creative Computing* Volume 2. It contains a potpourri of information on languages and programming theory, on artificial intelligence, on computers in education and in the arts. 67 pages are devoted to puzzles, programs, and things to do. Edited by David Ahl. Large format paperbound.

#6B....**Best of Creative Computing Vol. 2** .....$8.95 (P&H: $2)

Best of Creative Computing Volume 3

336 pages of articles, activities, fiction, games, programs, reviews, cartoons, and other information from Volume 3 of *Creative Computing*. It includes features on technology, public access, educational use, medical applications, and computers in music. It contains great resource listings and reviews of calculators, games, equipment, software, and books. There are 96 pages of things to do—puzzles, programs, problems, and games. Edited by David Ahl and Burchenal Green. Large format paperbound, 336 pages.

#12C....**Best of Creative Computing Vol. 3** .....$8.95 (P&H: $2)

The Colossal Computer Cartoon Book

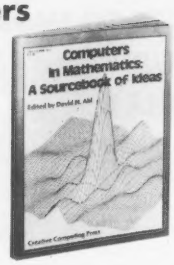
The best collection of computer cartoons ever is now in its second printing. The fifteen chapters contain hundreds of cartoons about robots, computer dating, computers in the office, home, and lab, and much more. Large format paperbound, 120 pages.

#6G....**The Colossal Computer Cartoon Book** .....$4.95 (P&H: $1)

How to use computers to help teach math!

COMPUTERS IN MATHEMATICS:

A SOURCEBOOK OF IDEAS



The National Council of Teachers of Mathematics has strongly endorsed the use of computers in the classroom. Yet most textbooks don't include programs or computer teaching techniques. And you probably don't have the time to develop programs on your own.

Computers in Mathematics can solve your problem. It contains pragmatic, ready-to-use, classroom-tested ideas on everything from simple binary counting to multiple regression analysis and differential equations. Whether you teach first grade or twelfth, you'll find plenty of ways to use computers to help you teach mathematical concepts.

Computers In Mathematics includes 134 articles and applications written for *Creative Computing* by math teachers. Flowcharts, programs and sample runs that make it easy to use. Over 250 problems, puzzles and programming ideas. And even many activities that don't require a computer.

#12D....**224 pages, large format. Softbound** ..... $15.95 (P&H: $2)

The most complex computer circuit can be explained with just nine pennies!

COMPUTER COIN GAMES

Now there's an easy (and fun) way to learn about the inner workings of computers! *Computer Coin Games*, by Joe Weisbecker (the designer of the RCA 1802 microcomputer), simplifies the concepts of computer circuitry through games played with your pennies and the playing boards supplied. Even the most complex circuitry is made understandable!

Games Magazine said, "Whether or not you have any experience with computer technology, you'll be both amazed and delighted with the simplicity of the format and the complexity of the play. All you need are some common cents."

#10R....**Computer Coin Games**..... $3.95 (P&H: $1)

BOOKS ORDERING INFORMATION (IF ORDER FORM IS MISSING)

Send payment (NJ residents add 5% sales tax) plus postage and handling charges (appears in parentheses ( ) following the price of each book) to Creative Computing, Dept. C720, 39 E. Hanover Avenue, Morris Plains, NJ 07950. Orders may also be charged to your Visa, Mastercard or American Express account—by mail include credit card name, number and expiration date, or, use our toll-free number 800-631-8112. In NJ only 201-540-0445.

side...the other side...the

Guy Kewney

It just isn't possible to explain to anybody in America, quite what a fuss is being raised about the British Broadcasting Corporation's new microcomputer in Europe.

The machine itself is about half the price of a naked Apple II, and offers about as much as an Apple, an Atari, a VIC and a Nestar network all put together — so it's an impressive machine. But that doesn't explain, on its own, suspicions of dirty dealing, allegations of black markets, and all-round jealousy on an incredible scale.

The machine and its fuss have almost totally overshadowed several significant events, including the release of a French look-alike for the Osborne 1, a big boom in "software publishing" and Clive Sinclair's plans for a new machine.

The BBC computer, then, is late. Quite why this should be surprising isn't clear to me, given the troubled history of the beast, which a year ago was still a design under alteration by committee — but people are very indignant about the fact that a series has started on television, featuring a beautiful machine which nobody can get his hands on.

I suppose the explanation is that winning the contract to design and supply the BBC micro was a prestige contract as well as a lucrative one. It spelled recognition in letters so big that the BBC's book on computers, published to back up the program, didn't mention the firm that builds the machine — not even once.

The contract went to a company called Acorn. Acorn became famous when it was one of two companies selected by the British Department of Education to supply micros to schools. The deal was that each high school got one micro, and the Government stumped up half the price. And since the other "approved" micro cost around £2000 sterling, and the Acorn Atom cost around £150 sterling, you can place your own bets on which machine sold most under this scheme.

The BBC had plans for a broadcast program on "encouraging computer literacy" as long ago as November 1980, when it awarded the contract for building its approved micro to a firm called Newbury.

Newbury is the Lear Siegler of Britain, and it had inherited a computer which it called the Newbrain, from the wreckage of Clive Sinclair's first company. The government had rescued Sinclair, and had grabbed two of his microcomputer designs in exchange, kicking him out with an obvious loser (a design called the ZX80) to manage as best he could.

Newbury packaged Sinclair's idea into a series of powerful hand-held machines, capable of sitting on an office desk and driving a video display, but also of working on your lap in the train, off batteries.

It seems that it hadn't really occurred to either Newbury or the BBC that running a program on television, featuring a brand new micro of revolutionary design, might attract the attention of more than a couple of thousand customers.

And just about the time that this message was getting through inside the BBC, Newbury decided (for reasons they have tried to explain to me, but failed) that the business it understood was the computer terminal market, and it was not going to get into the dangerous-looking micro business on a large scale.

Newbury cancelled the project and killed the Newbrain, having first dismissed the managing director who had thought of the project. He eventually bought the project from Newbury, and the Newbrain is available at last — but as late as the Apple III, and in similar quantities.

This cunning marketing ploy left the BBC with a "pilot" program featuring a non-existent machine, and a sense of urgency amounting almost to panic. "Who," it said, "will help us?"

"I will," said almost every little red hen in the book. Sinclair said he would let them use his ZX81, newly launched at the time. Transam offered a machine like the Apple but using the S-100 bus and CP/M — called the Tuscan. Tangerine offered a choice of any of its popular hobbyist-experimenter micros.

And Acorn revealed, diffidently, that it had a rather ambitious design to follow up its popular Atom — a design called the Proton.

At this point, the accusations of double-dealing started to be heard.

A very respected micro pioneer called John Coll was at that time a teacher, an adviser to the BBC on its micro project, and a man looking for a job in the micro business.

First, Coll accepted a job with Apple UK as head of education sales. Then, before he could take this job up, he accepted a similar job with Acorn — who subsequently announced that they would build the official BBC micro.

My own suspicions are easily aroused by this sort of thing, but in this case I don't think there is any double-dealing to find. Apart from the fact that Coll is an old friend of mine, and honest (as are all my friends, of course) as the day is long, I think the computer which Acorn designed answers any doubts on its own merit.

The Machine

So, a bit about the machine.

It uses the 6502 chip, like its predecessor. And it has one or two of the features which distinguished the Atom from the rest of the pack — primarily a very friendly machine code running system. This lets you type lines of assembler mnemonic into the Basic listing as if they were lines of Basic, and runs them under Basic — not as fast as a fully machine-code routine, but much faster than Basic.

But it goes much further: the machine display facilities equal anything in the new Commodore Ultimax family for color and sound and games. The Basic is very powerful and "structured" in a way that rivals the latest educational cult language Comal, and the main circuit board includes, as standard, a local area network

which misses only the £50 worth of chips needed to upgrade the basic machine. And it has all the usual games paddle inputs, printer circuits, and so on, included.

Best of all is the "Tube" — which is 4K of machine code in ROM, which allow the BBC micro to act as a "slave" to a more powerful processor.

Possible "master" processor designs already in prototype at Acorn include a Z80 based CP/M master, a 6502 master running at 3 MHz, a Motorola 68000 based master running Unix, and even a 32-bit National Semiconductor 16032 chip, which I have actually seen running.

All of these masters retain the marvellous display of the BBC CPU — color, sound, and interfaces.

As an example of how the Tube works, Acorn quotes the CP/M master. Instead of the normal BIOS, the master has the Tube software in its top 4K of memory. All calls made by standard CP/M software are trapped by the Tube, and passed to the BBC micro. Here the CP/M procedures (excluding known bugs) are emulated by the 6502, running quite a bit faster on input and output than the Z80 can, and the necessary data are then passed back through the tube to the Z80 processor, which carries on proudly processing, in the belief that it has done all the hard work.

Cost of BBC micro and Z80 master together should be very similar to the cost of an Osborne 1.

A very tasty machine. Since it was just a prototype this time twelve months ago, with the Basic and machine code ROM barely started and not finalized, I'm not astonished that the machine is only available in tens, rather than the thousands or tens of thousands which people would like to buy.

Commodore UK isn't surprised either, and is cashing in enormously with its VIC — selling 10,000 machines a month through normal electrical and electronic consumer shop chains. Even Texas Instruments is (apparently) managing to sell some of its 99/4s in the vacuum.

But other people are surprised, and accusations of black marketeering, profiteering and muddleering are plentiful. That doesn't surprise me either, because the BBC project is more than success (which none of us begrudges a rival) but recognition. And recognition is unforgiveable.

Here We Go Again

All this hassle will start to repeat itself over the next month or so, as the UK Department of Industry selects the "approved" micros for supply to Government installations.

Last year, the department advertised for people to be approved without telling anybody that that was what was happening.

In a masterly piece of non-publicity, the civil servants arranged to run two small advertisements inviting tenders for "a project" using micros. Not everybody saw the advertisement, and those who did, didn't read into its moderate offering the notion that if they didn't get this one, nobody in Government would be *allowed* to buy their micros. But that turned out to be the case.

Pressed, the official concerned informed me afterwards that the ploy had been deliberate. "If it had been known that we were selecting an 'approved' list," he said, "then every paper tiger in town would have been offered. The way we did it, if somebody had design problems or production teething troubles, they held back, and we did without their problems."

Nice logic, but it only works once. Enraged, those excluded from the glory list are now lobbying furiously to get their newest paper tigers on the new list, being drawn up now. It includes some American manufacturers, which is apparently unforgiveable.

Guy Kewney

Across The Channel

They do these things with even more enthusiasm in France, however.

In that country, the micro industry is severely handicapped by two aspects of French chauvinism: first, a determination to do everything through local manufacturers; and second, a commitment to companies that do defense contracts.

Defense contracts, in France as elsewhere, mean rich pickings — but in France, the control of the market is very jealous because of the country's enthusiastic rejection of American and British suppliers. The result is that anybody who can get a defense contract sets up an operation designed not for the economics of market pressure, but for the economics of Government contracting. And thus are they rendered unable to compete in open markets, and their products rendered overpriced to the consumer.

Whatever, the country doesn't have a strong micro manufacturing sector. So it was astonishing to see an Osborne lookalike emerge from France before the UK or Germany could try it.

The imitation isn't available on the open market yet, but it weighs a little more, costs a little more, and offers a little less in the way of software.

One thing it does have, however, is a pair of smaller diskettes (the BASF two-third size drive) which allows a slightly bigger screen. And another thing is an acoustic coupler built in.

Another Sinclair?

By the time you read this, Clive Sinclair will probably have astonished Europe with his next micro.

All I know about it is guesswork confused by gleefully misleading hints and quips from Clive himself, but here are some pointers.

First, Clive Sinclair is incensed and enraged about the awarding of the BBC contract to Acorn, beyond the rage of anybody else. Apart from the fact that one of the partners of Acorn used to work for him before splitting off, he felt rejected by the established authorities, who still regard him with suspicion. And he felt that his best-selling ZX81 design, now into its second half-million production, stood a better chance of being ready by the launch of the TV series.

So I expect Clive to produce a "BBC killer" — with a proper keyboard, color, game paddles, and more standard peripherals than his ultra-cheap printer.

He will stick to his own Basic, though he may enhance it, because he's proud of that. It is, after all, a nice Basic, in that it won't let you enter a faulty line (the way Hewlett-Packard's HP85 Basic won't) and runs pretty quickly too.

Clive has said, very definitely, that the new machine won't be a rival to his ZX81, which is taking off all by itself. I believe him, though he has little to lose by producing a rival. With 500,000 machines installed, the Sinclair has become an industry of its own.

As an illustration of the popularity of the micro: at a recent London computer show, dedicated to the ZX range, there were no fewer than 60 different companies selling add-ons, plug-ins, modifications, programs, things to go underneath, things to be controlled by, and things to replace, the ZX81.

Some of them were very sophisticated laboratory controllers, some were very cheap diskette interfaces and drives, some were proper keyboards, and some were just games.

I gather that there are twice that number of firms in the business already. □

ARTWORX. IT'S A WHOLE NEW WORLD OF SOFTWARE.

Scene from BETA FIGHTER during creation using the DRAWPIC graphics editor.

HODGE PODGE: by Marsha Meredith (Atari and Apple)

NOW AVAILABLE FOR ATARI!!! This captivating program is a marvelous learning device for children from 18 months to 6 years. HODGE PODGE consists of many cartoons, animation and songs which appear when any key on the computer is depressed. A must for any family containing young children.
PRICE ..... **$19.95** diskette

☐ **PM EDITOR:** by Dennis Zander (Atari, 16K)
Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (PO$(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in **ARTWORX** RINGS OF THE EMPIRE and ENCOUNTER AT QUESTAR IV.
PRICE ..... **$29.95** cassette **$33.95** diskette

☐ **ROCKET RAIDERS** by Richard Petersen (Atari 24K)
Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.
PRICE ..... **$19.95** cassette **$23.95** diskette

☐ **FOREST FIRE!:** by Richard Petersen (Atari,24K)
Using excellent color graphics, your Atari is turned into a fire scanner to help you direct operations to contain a forest fire. You must compensate for changes in wind, weather and terrain. Not protecting valuable property can result in startling penalties. Life-like variables make FOREST FIRE a very suspenseful and challenging simulation. **PRICE** ..... **$16.95** cassette **$20.95** diskette

☐ **GIANT SLALOM:** by Dennis Zander (Atari, 16K)
Bring the Winter Olympics to your computer anytime of the year! Use the joystick to guide your skier's path down a giant slalom course consisting of open and closed gates. Choose from three levels of difficulty. Take practice runs or compete against from two to eight additional skiers.
PRICE ..... **$15.95** cassette **$19.95** diskette

☐ **THE PREDICTOR** by Thomas Barker (Apple, Atari, TRS-80, North Star and CP/M (M-BASIC).
This is a complete package that covers least squares fitting of parameters for two or more variables. THE PREDICTOR can be used for predicting sales and process behavior, trend analysis, model building and many other uses calling for multilinear regression techniques. Each option in the program is prompted with simple YES/NO commands making it **very** easy to use.
PRICE ..... **$29.95** diskette

☐ **PILOT:** by Michael Piro (Atari, 16K)
Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. PILOT produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency.
PRICE ..... **$16.95** cassette **$20.95** diskette

☐ **TEACHER'S PET:** by Arthur Walsh (Atari, Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems).
This is an introduction to computers as well as a learning tool for the young computerist (ages 3-7). The program provides counting practice, letter-word recognition and three levels of math skills.
PRICE ..... **$14.95** cassette **$18.95** diskette

☐ **MAIL LIST 3.0:** (Atari, Apple and North Star)
The very popular MAIL LIST 2.2 has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. MAIL LIST is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names!). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3-up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and MAIL LIST will even find and delete duplicate entries! The address files created with MAIL LIST are completely compatible with **ARTWORX** FORM LETTER SYSTEM.
PRICE ..... **$49.95** diskette

☐ **THE VAULTS OF ZURICH:** by Felix and Greg Herlihy (Atari, 24K, PET)
Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: THE OPEC OIL DEEDS!
PRICE ..... **$21.95** cassette **$25.95** diskette

☐ **BRIDGE 2.0** by Arthur Walsh (Atari (24K), Apple TRS-80, PET, North Star and CP/M (MBASIC) systems)
Rated #1 by Creative Computing, BRIDGE 2.0 is the only program that allows you to both bid for the contract and play out the hand (on defense or offense!). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available.
PRICE ..... **$17.95** cassette **$21.95** diskette

☐ **ENCOUNTER AT QUESTAR IV:** by Douglas McFarland (Atari, 24K)
As helmsman of Rikar starship, you must defend Questar Sector IV from the dreaded Zentarians. Using your plasma beam, hyperspace engines and wits to avoid Zentarian mines and death phasers, you struggle to stay alive. This BASIC/Assembly level program has super sound, full player missile graphics and real time action.
PRICE ..... **$21.95** cassette **$25.95** diskette

NEW PROGRAMS!

HAZARD RUN: by Dennis Zander (Atari, 16K)
The sheriff has spotted you and you must make the treacherous run through Crooked Canyon past Bryan's Pond to the jump at Hazard Creek and safety. You can even put the joystick-controlled GEE LEE car up on two wheels to make it through some tight spots. A lead foot is not always the answer as you dodge trees, rocks and chickens in this nerve-racking game. HAZARD RUN employs full use of player/missile graphics, re-defined characters and fine scrolling techniques to provide loads of fast action and visual excitement.
PRICE..... **$27.95** cassette **$31.95** diskette

BETA FIGHTER: by Douglas McFarland (Atari, 16K)
See who will be the ace gunner in this action game set on a spectacular Martian landscape. BETA FIGHTER can be played with one or two players and uses player/missile graphics and delightful sound effects.
PRICE..... **$16.95** cassette **$20.95** diskette

DRAWPIC: by Dennis Zander (Atari 16K)
DRAWPIC provides the user with an unbelievably easy way to create screens in graphics modes 3-7. Just sit back with your joystick and use POINT PLOT, DRAW LINE, RUBBER BAND fill and COLOR SET to create beautiful images on your Atari. Full or partial screen images are saved as string data in the program and can be instantly recalled and combined into new images using machine language subroutines. These graphic images can be easily incorporated into your own programs. The images of HODGE PODGE and the landscape of BETA FIGHTER were made using DRAWPIC.
PRICE ..... **$29.95** cassette **$33.95** diskette

T: A TEXT DISPLAY DEVICE: by Joseph Wrobel (Atari 16K)
T: is an auto-loading, co-resident assembly language routine which greatly expands the display capabilities of the Atari. It allows you to freely intermix both text and graphics without the use of modified display lists, PEEKS or POKES. This is done by defining a new device ("T:"); printing to that device puts text onto the screen. The size of the text is determined by the graphics mode used.
PRICE..... **$17.95** cassette **$17.95** diskette

ORDERING INFORMATION

Call ARTWORX toll-free number to order direct:
800-828-6573
In New York, Alaska, Hawaii call:
(716) 425-2833

All orders are processed and shipped within 48 hours.

Shipping and handling charges:
Within North America: Add $2.00
Outside North America: Add 10% (Air Mail)
New York State residents add 7% sales tax

Quantity Discounts:
Deduct 10% when ordering 3 or more programs

Ask for ARTWORX at your local computer store.

Write for FREE Catalogue listing more information about these and other quality ARTWORX programs.

Artworx

150 North Main Street Fairport, NY 14450

David and Sandy Small

For this month's column, a variety of interesting things, including some coverage of the recent West Coast Computer Faire (edited for Atari-interested readers), program listings, interesting news from the mail box, language reviews, and so Forth.

The 7th West Coast Computer Faire was held March 19-22 at the San Francisco Civic Center (in San Francisco, CA, naturally). It was quite a show. Being as near as it was to the various Atari offices in the southern Bay area, it attracted many Atari employees. A large number of software and hardware houses were also there to show off their Atari products.

There was some exciting new hardware demonstrated, such as the 80-column video output board from Bit-3 and the PROMmer package from MPC, and also some old friends, such as the RAMDisk from Axlon.

Of course, there was a large variety of software also, which ranged from the new *Apple Panic* for the Atari to the nth version of *Protector* from Synapse. We'll be reviewing many of these products in future issues. I am especially interested in the 80-column word processor that LJK is writing specially for Bit-3.

Some of the exhibitors had really classy booths. Scott Adams of Adventure International showed up with a complete castle, and ran business from within. Sirius had what looked like a coin-op arcade game set up with an Apple inside, and On-Line and Creative Computing had a large number of games set up to play. (John Harris was showing off his new "Frogger," for instance).

David & Sandy Small, 11314 Yucca Dr., Austin, TX 78750.

I had a fine time, and talked with lots of people. One thing that consistently came out when talking to software houses (Sirius, Creative Computing, Synapse, Adventure International, Datasoft, Gebelli, etc.—the list gets longer every day) was the great interest in Atari software. If you have written some decent software, particularly a game, be sure to let a software house see it; it may be worth your while.

Our Readers Write

Now, let's turn to our mail box. We have been a bit negligent in answering letters. There is a reason for this: our new son, Eric, was born in January. Those of you who know about newborns know exactly how much spare time we had for a while there. But we are learning to manage, and things are slowly returning to a new kind of normal.

Opening the mailbox has become a bit like Christmas, with users sending in their latest code and accomplishments, plus new product announcements. Here's some of the best we have seen; there will be more next month.

Drew Holcomb sends a very nice graphics demonstration (Listing 1) which is worth the five minutes it takes to type in.

Thomas Marshall (those of you on the CERL PLATO network system know him as marshall/phystemp) sends in the fine program in Listing 2 which uses the DLI routine from the December column. It puts a 128-color menu onscreen, then allows the user to move a cursor around the colors. When the user settles on a color and presses the button, the decimal value of the color (for use in SETCOLOR) appears in players on the top and bottom of the screen. There are some very nice techniques being used here; the program deserves a good look. Thanks Tom.

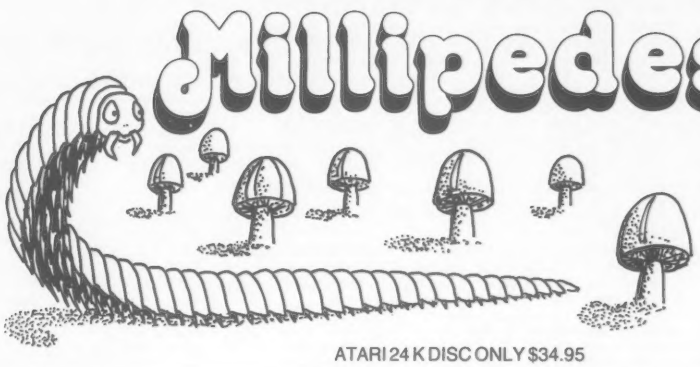
Dennis Baer (868 Main St., Farmingdale, NY 11735) has Algol for the Atari. Ac-

Listing 1.

```
WHEELS

5 REM WHEELES WITHIN WHEELS BY D. HOLCOMB
10 GRAPHICS 23:Y=INT(RND(0)*16):FOR X=708 TO 711:POKE X,Y*16+12:NEXT X:COLOR 1:D
EG
20 FOR X=1 TO RND(0)*4+2:A=INT(RND(0)*5)*1000+2000:POKE 77,0
30 B=(INT(RND(0)*11)*INT(RND(0)*5)^2-79)*INT((RND(0)*2)-1)/(A/1500)+79
35 C=(INT(RND(0)*4)*INT(RND(0)*5)^2-47)*INT((RND(0)*2)-1)/(A/1500)+47
40 D=0:E=INT(RND(0)*3)-1:IF E=0 THEN 40
50 FOR Y=0 TO A STEP 15:F=F+E:IF F<1 THEN F=3
60 IF F>3 THEN F=1
70 COLOR F:D=D+0.08:DRAWTO B+D*COS(Y),C+D*SIN(Y)
80 NEXT Y:NEXT X
90 FOR Z=0 TO 9
100 A=RND(0)*16:B=RND(0)*9+4:C=RND(0)*30+10
110 FOR X=0 TO 1500/C
120 FOR Y=0 TO 2:SETCOLOR Y,A,B:FOR F=0 TO C:NEXT F
130 SETCOLOR Y,0,0:NEXT Y:NEXT X:NEXT Z:GOTO 10
```

SOFTWARE STREET

PRESENTS



ATARI 24 K DISC ONLY $34.95

BY
BILL BOGENREIF

800 Computer 16K	$949.00
410 Recorder	$79.00
850 Intf. Mod	$159.00
830 Modem	$149.00

Special Software Packages

The Entertainer Star Raiders, Missile Command, and Joysticks.	$84.00
The Programmer Basic Programming language, Self teaching guide to Basic and Basic reference manual	$54.00
The Educator 410 Recorder, Basic programming language, and States and Capitals.	$115.00

TOP SELLING PROGRAMS

Missile Command	$33.96
Asteroids	$33.96
Invitation to Prog. 2	$16.96
Invitation to Prog. 3	$16.96
Assembler/Editor	$48.96
Jaw Breaker	$25.95
Cranston Manor	$24.95
Dodge Racer	$19.95
Star Raiders	$39.96
Sammy the Sea Serpent	$14.95
Krazy Shootout	$35.95
Space Invaders	$35.95

810 Disk Drive	$429.00

Prices subject to change

THE ABOVE PRICES ARE FOR PRE-PAID ORDERS.

We also feature tremendous savings from:
- Atari
- Atari Program Exchange
- Adventure International
- Crystal
- P.D.I.
- L.J.K.
- Dynacomp
- Quality Software
- Avalon Hill
- Epyx
- Computer Consultants
- Synapse
- Datasoft
- United Software
- On-Line
- O.S.S.
- Software Street

Software Street is your mail order ATARI discount center.

Shipping costs:
Software - minimum $2.00
Hardware - prices will vary (please call)

VISA MasterCard

Call or write for your FREE catalog.

Dealer inquiries welcome.

Software Street
3392 Clipper Dr.
Chino, CA 91710
(714) 591-3061

ATARI

ATARI IS A REGISTERED TRADEMARK

CIRCLE 240 ON READER SERVICE CARD

cording to his letter, it supports all I/O and graphics also. He also has a word processor for the Atari written in Algol. Since there are quite a few folks familiar with Algol, you might want to get in touch. He mentioned he is interested in beta-testing his product.

The Young People's LOGO Association wants to hear from people interested in Atari Pilot. Contact them at 1208 Hillsdale Dr., Richardson, TX 75081. They have a very good newsletter and a great deal of interest in the Logo language.

Atari in Europe

Finally, Nigel Haslock in Switzerland wrote to give me details of the European Ataris. Software houses may be quite interested in this information. He writes:

- European Ataris run 12% slower if tied to VBLANK.
- Atari has kept the one CPU clock/color clock; hence, the 6502 is a 3 MHz model (not 2 MHZ as in the United States), and is clocked at 2.217 MHz or about 25% faster.
- All European models have GTIA chips—hence the GTIA shortage here.
- The E000 and F000 ROMS are different (hence many software problems).
- Cassette handling is different and possibly incompatible.

I have also received a great deal of mail concerning piracy and disk copy protection, which Nigel mentions. He tells of not being able to fix US-version Atari programs to work on the European Ataris because of the copy-locks placed on them. He has a good point.

There is a European market looking for software. Besides the obvious language problems, software houses have another worry—will their software work as it is with a PAL TV?

Atari has provided a hardware location to determine if a given machine is PAL (European) or NTSC (North American); it looks as if it's time to start writing software to check it.

Atari Basic

For those of you with new Ataris, here is a short and highly opinionated discussion of the various languages available for your use. It may serve to clear up some of the confusion you may have over which language is best for you to buy and use. Doubtless, there will be those who will disagree with me; feel free to write and let me know if you do.

Atari Basic, in the 8K cartridge is the original language for this system, developed in a great hurry for the unveiling of the new Atari machines back in 1978. Like

Listing 2.

```
COLOR128

19000 REM The following subroutine can
19001 REM be added to program 5 of
19002 REM ATARI OUTPOST in the December
19003 REM issue of Creative Computing.
19004 REM It addes utility to displaying
19005 REM the 128 colors available to
19006 REM the Atari.  By plugging a
19007 REM joystick in port 1, the sub-
19008 REM routine will give you the
19009 REM specific number one needs to
19010 REM poke in the color registers.
19011 REM
19020 REM POKE 708,XXX   COLOR 0
19021 REM POKE 709,XXX   COLOR 1
19022 REM POKE 710,XXX   COLOR 2
19023 REM POKE 711,XXX   COLOR 3
19024 REM POKE 712,XXX   COLOR 4
19025 REM
19030 REM In program 5, besure to add
19031 REM 410 GOTO 20000
19032 REM
20000 X=105:Y=8
20010 A=PEEK(106)-24:POKE 54279,A:PMBASE=256*A
20020 POKE 559,46:REM DOUBLE LINE RES.
20021 POKE 623,4:REM PLAYFIELD OVER PLAYER PRIORITY
20022 POKE 53277,3:REM TURN ON PM GR.
20030 FOR III=PMBASE+384 TO PMBASE+1024:POKE III,0:NEXT III:REM CLEAR P-M GR....
20040 POKE 53248,X:REM PL 0 POSITION
20041 POKE 53249,X+16:REM PL 1 POSITION
20042 POKE 53250,X+32:REM PL 2 POSITION
20043 POKE 53251,X-32:REM PL 3 POSITION
20044 POKE 53252,X+48:REM MI 0 POSITION
20045 POKE 53253,X+56:REM MI 1 POSITION
20046 POKE 53254,X+64:REM MI 2 POSITION
20047 POKE 53255,X+72:REM MI 3 POSITION
20050 POKE 704,53:REM PL 0 COLOR ORANGE
20051 POKE 705,65:REM PL 1 COLOR RED
20052 POKE 706,145:REM PL 2 COLOR BLUE
20053 POKE 707,27:REM PL 3 COLOR YELLOW
20069 REM PLAYER SIZE:  0=NORMAL,1=DOUBLE,3,DQUADRUPLE
20070 POKE 53256,1:POKE 53257,1:POKE 53258,1:POKE 53259,3
20071 POKE 53260,255:REM SAME CONVENTION BUT 2 BITS FOR EACH MISSILE SIZE
20080 REM *** PRINTS MISSILE NOS. *****
20090 CHR=17:II=0:FOR III=PMBASE+512+Y TO PMBASE+519+Y:POKE III,PEEK(57344+CHR*8
+II):II=II+1:NEXT III
20091 CHR=18:II=0:FOR III=PMBASE+640+Y TO PMBASE+647+Y:POKE III,PEEK(57344+CHR*8
+II):II=II+1:NEXT III
20092 CHR=24:II=0:FOR III=PMBASE+768+Y TO PMBASE+775+Y:POKE III,PEEK(57344+CHR*8
+II):II=II+1:NEXT III
20093 FOR N=PMBASE+512 TO PMBASE+1024 STEP 128
20094 FOR M=16 TO 0 STEP -1
20095 POKE N-M,255:NEXT M:NEXT N
20096 XO=125:XN=125:YO=93:YN=93:COLR=255:Y=8:GOTO 20170
20099 REM ***** JOYSTICK ROUTINE ******
20100 MOVE=STICK(0):IF STRIG(0)=0 THEN 20230
20105 IF MOVE<>7 AND MOVE<>11 AND MOVE<>13 AND MOVE<>14 THEN 20100
20110 IF MOVE=14 THEN YN=YO-3:COLR=COLR-2:IF YN<0 THEN YN=93:COLR=COLR+64
20120 IF MOVE=13 THEN YN=YO+3:COLR=COLR+2:IF YN>94 THEN YN=0:COLR=COLR-64
20140 IF MOVE=11 THEN XN=XO-40:COLR=COLR-64:IF XN<0 THEN XN=125:COLR=COLR+256
20150 IF MOVE=7 THEN XN=XO+40:COLR=COLR+64:IF XN>141 THEN XN=5:COLR=COLR-256
20170 LOCATE XO+10,YO,CO:CN=CO-2:IF CN<0 THEN CN=CO+2
20180 COLOR CO:PLOT XO,YO:DRAWTO XO+5,YO:PLOT XO,YO+1:DRAWTO XO+5,YO+1
20190 COLOR CN:PLOT XN,YN:DRAWTO XN+5,YN:PLOT XN,YN+1:DRAWTO XN+5,YN+1
20200 XO=XN:YO=YN
20220 GOTO 20100
20230 FOR N=0 TO 3:POKE 704+N,COLR:NEXT N
20235 REM DISASEMBLE COLR FOR PM PRINT
20240 IF COLR>99 THEN CHR0=16+INT(COLR/100):CHR1=16+INT((COLR-(CHR0-16)*100)/10)
20241 IF COLR>99 THEN CHR2=16+COLR-(CHR0-16)*100-(CHR1-16)*10:GOTO 20300
20250 IF COLR>9 THEN CHR0=16:CHR1=16+INT(COLR/10):CHR2=16+COLR-(CHR1-16)*10:GOTO
 20300
20260 CHR0=16:CHR1=16:CHR2=16+COLR
20300 II=0:FOR III=PMBASE+512+Y TO PMBASE+519+Y:POKE III,PEEK(57344+CHR0*8+II):I
I=II+1:NEXT III
20310 II=0:FOR III=PMBASE+640+Y TO PMBASE+647+Y:POKE III,PEEK(57344+CHR1*8+II):I
I=II+1:NEXT III
20320 II=0:FOR III=PMBASE+768+Y TO PMBASE+775+Y:POKE III,PEEK(57344+CHR2*8+II):I
I=II+1:NEXT III
20500 GOTO 20100
20890 REM
20900 REM If you change graphics modes
20905 REM from here, suggest you
20910 REM FOR N=0 TO 7
20920 REM POKE 53248+N,0
20930 REM NEXT N
20940 REM to remove the player-missile
20950 REM graphics from the screen.
```

apple discount software

CALSOFT

Personal—Entertainment—Business SOFTWARE

We have all the latest software—ASK US!

Low Discount Prices / 15 to 25% Discount off List Price
Fast Convenient Service / We ship same or next day
Large Selection of Software / Call or Write for our FREE Catalog!

TRS-80, PET, ATARI: send for FREE catalog!

Call Toll Free: *(800) 423-5290* ***In California:*** *(213) 991-9641*

All products below are on Disk unless otherwise noted

✓ *Also available on cassette*

AVANT-GARDE

	Retail Price	Our Price
★ **Hi-Rés Secrets**		**125.00**	**93.75**
Hi-Res Computer Golf	NEW	29.95	**25.45**

BRODERBUND

Space Warrior	24.95	**21.20**
Apple Panic	29.95	**25.45**
★ **Space Quarks**	**29.95**	**22.45**
Genetic Drift	29.95	**25.45**
Red Alert	29.95	**25.45**
David's Midnight Magic	34.95	**29.70**
The Arcade Machine	44.95	**38.20**
★ **Track Attack**	**29.95**	**22.45**
Star Blazer	NEW	31.95	**27.15**

CAL PACIFIC

★ **Bill Budge's 3D Graphics**	**39.95**	**29.95**
Apple-oids	29.95	**25.45**
Akalabeth	34.95	**29.70**
Ultima	39.95	**33.95**

CAVALIER

The Asteroid Field	24.95	**21.20**
Star Thief	29.95	**25.45**
★ **Bug Attack**	**29.95**	**22.45**

CONTINENTAL

★ **Home Accountant**	**74.95**	**56.20**
Home Money Minder	34.95	**29.70**
Mailroom	34.95	**29.70**
3-D Skiing	24.95	**21.20**

DAKIN5

Alkemstone	39.95	**33.95**
Dragon Fire	49.95	**42.45**
Kaves of Karkhan	39.95	**33.95**
★ **Business Bookkeeping System**	NEW	**395.00**	**296.25**
Depreciation Planner	NEW	395.00	**335.75**

EDU-WARE

The Prisoner	29.95	**25.45**
Empire I World Builders	32.95	**28.00**
Empire II Interstellar Sharks	32.95	**28.00**
Empire III Armageddon	32.95	**28.00**

GEBELLI

★ **Firebird**	**29.95**	**22.45**
Ruski Duck	NEW	34.95	**29.70**
Horizon V	NEW	34.95	**29.70**

HAYDEN

Sargon II ✓	34.95	**29.70**
Reversal ✓	34.95	**29.70**
Assembly Lang. Dev. Sys.	39.95	**33.95**
Applesoft Compiler 3.3	175.00	**148.75**
★ **Pie Writer**	NEW	**129.95**	**97.45**

INNOVATIVE DESIGN

Pool 1.5	34.95	**29.70**
Shuffleboard	29.95	**25.45**
★ **Trick Shot**	**39.95**	**29.95**

MICRO LAB

★ **Data Factory**	**300.00**	**225.00**
The Asset Manager	200.00	**170.00**
Roach Hotel	NEW	34.95	**29.70**

MICROSOFT

Adventure	29.95	**25.45**
Typing Tutor II	24.95	**21.20**
Olympic Decathalon	29.95	**25.45**
TASC Compiler	175.00	**148.75**

MUSE

ABM	24.95	**21.20**
★ **Super Text II**	**150.00**	**112.50**
Three Mile Island	39.95	**33.95**
Robot War	39.95	**33.95**
Castle Wolfenstein	29.95	**25.45**

ON-LINE SYSTEMS

HI-RES Adv-0 Mission Asteroid	19.95	**16.95**
HI-RES Adv-1 Mystery House	24.95	**21.20**
★ **HI-RES Adv-2 Wizard & Princess**	**32.95**	**24.70**
HI-RES Adv-3 Cranston Manor	34.95	**29.70**
HI-RES Adv-4 Ulysses	34.95	**29.70**
HI-RES Adv-5 Time Zone	99.95	**84.95**
★ **HI-RES Football**	**39.95**	**29.95**
HI-RES Soccer	29.95	**25.45**
Cross Fire	29.95	**25.45**
LISA	79.95	**67.95**
★ **LISA Educational System**	**119.95**	**89.95**
The Dictionary	99.95	**84.95**
★ **General Manager**	**99.95**	**74.95**
Pegasus II	29.95	**25.45**
Threshold	39.95	**33.95**
Superscribe II Word Processor	129.95	**110.45**
Expediter II+	NEW	139.95	**118.95**
Jawbreaker	29.95	**25.45**
Mouskattack	34.95	**29.70**
Marauder	34.95	**29.70**
Ultima II	NEW	54.95	**46.70**
EPF IV	NEW	79.95	**67.95**

VISICORP

Desktop Plan II	250.00	**212.50**
Visiplot	200.00	**170.00**
Visitrend/Visiplot	300.00	**255.00**
Visidex	250.00	**212.50**
Visiterm	100.00	**85.00**
Visicalc 3.3	250.00	**212.50**
Visifile	250.00	**212.50**
★ **Monty Plays Monopoly**	**34.95**	**26.20**
Bridge Partner	24.95	**21.20**
Checker King	24.95	**21.20**
Gammon Gambler	24.95	**21.20**
Monty Plays Scrabble	34.95	**29.70**

SOFTWARE PUBLISHING

PFS	125.00	**106.25**
★ **PFS: Report**	**95.00**	**71.25**

TG PRODUCTS

Game Paddles	39.95	**33.95**
★ **Joystick**	**59.95**	**44.95**
Select-a-Port	59.95	**50.95**

SIRIUS SOFTWARE

Space Eggs	29.95	**25.45**
Autobahn	29.95	**25.45**
Gamma Goblins	29.95	**25.45**
★ **Gorgon**	**39.95**	**29.95**
Sneakers	29.95	**25.45**
Epoch	34.95	**29.70**
★ **Copts & Robbers**	**34.95**	**26.20**
Outpost	29.95	**25.45**
★ **Beer Run**	**29.95**	**22.45**
Hadron	34.95	**29.70**
Dark Forest	29.95	**25.45**
Borg	29.95	**25.45**
The Joyport	74.95	**63.70**
Twerps	NEW	29.95	**25.45**
★ **Snake Byte**	NEW	**29.95**	**22.45**
Computer Foosball	NEW	29.95	**25.45**

STONEWARE

★ **DB Master**	**229.00**	**171.75**
DB Master Utility Pak #1	99.00	**84.15**
DB Master Utility Pak #2	99.00	**84.15**
DB Master Stat Pak	99.00	**84.15**

STRATEGIC SIMULATIONS

The Warp Factor	39.95	**33.95**
Cartels & Cutthroats	39.95	**33.95**
Computer Quarterback (2nd Ed.)	39.95	**33.95**
★ **The Shattered Alliance**	**59.95**	**44.95**
Computer Baseball	39.95	**33.95**
President Elect	39.95	**33.95**
The Battle of Shiloh	39.95	**33.95**
Tigers in the Snow	39.95	**33.95**
★ **Southern Command**	**59.95**	**44.95**
Napoleon's Campaigns	59.95	**50.95**
Road to Gettysburg	NEW	59.95	**50.95**
Pursuit of the Graf Spee	NEW	59.95	**50.95**

We also carry complete lines from the following companies:

ADVENTURE INTERNATIONAL
ARTSCI • AUTOMATED
AVALON HILL • BUDGECO
DATAMOST • DATASOFT
HIGHLANDS • HOWARD
INFOCOM • MICRO PRO
PHOENIX • PICCADILLY
QUALITY • RIVERBANK
SENSIBLE • SIERRA
SIR-TECH • SOFTAPE
SUBLOGIC • SYNERGISTIC
UNITED • VERSA

If you don't see it, Ask Us!

CALSOFT
6610 Tamarind St.
Agoura, CA 91301

Call Toll Free: *(800) 423-5290* ***In California:*** *(213) 991-9641*

We accept Mastercard & Visa (include No. and Expiration Date.) California residents add 6% sales tax. Include $2.00 for shipping. ($3.00 for UPS Blue Label.) Checks, COD ($1.50 extra) or Money Order.

★ ***Sale prices are through June only! Prices subject to change without notice.***

CIRCLE 118 ON READER SERVICE CARD

most things done in haste, it lacks something. In this case, speed and the fixing of obvious bugs were neglected to the point where the whole product was compromised.

All arithmetic done in this Basic is done in 6-byte BCD. While this gives great accuracy, it also slows execution to a crawl. Atari 8K Basic is the slowest Basic I have ever used. To be sure, all computers have a tradeoff between memory use and speed, but this is a little ridiculous.

Add to this the many known bugs that will crash the machine, the slowness and occasional inaccuracy of the floating point operations, and numerous other flaws, and it just isn't much of a language. It could have been done better.

Unfortunately, so much of the available software uses the Basic, and even the bugs (remember the old saw about "documented bugs" becoming features in the next version), that Atari can't fix it. We're stuck with it. Too bad.

For speed reasons, it is just about impossible to write professional software in Atari Basic; any assembly program runs so much faster than the Basic that there is no comparison. Games written in Basic are easily identifiable by their slow speed.

In all fairness, the Atari Basic cartridge was meant for small Basic programs, not the huge amounts of code it is sometimes asked to execute, so it must be forgiven. The overall design structure is just wrong for fast program execution.

In conclusion, I wish it were better, but we are stuck with it. Great things have been done with the computer in spite of the Basic, and many Atari users have been forced to 6502 Assembler because of it.

Speaking of which...

Atari 8K Editor/Assembler

The 8K Editor/Assembler is a close relative of the Basic cartridge. It is absolutely unacceptable for major software development. I can remember delays of up to an hour assembling large programs, and I have heard many other horror stories. This cartridge is also 8K and has bugs.

For instance, any CPY instruction hangs the TRACE function. This cartridge has inspired many software houses to come out with their own assemblers, some of which are very good. The Atari cartridge has a handy debugger, but as an assembler, (how do I put this tactfully?) it is useful only for assembling small subroutines for Basic.

One good thing about the Basic and Assembler/Editor cartridges is that there are now books designed to help the beginner get going with both of them. This is a good way to learn about the Atari and to get started but don't limit yourself to these products once you are past the beginning stage. Another advantage is that they are cartridges, so you don't have to buy a disk drive or more memory in order to run them, as is the case with most other languages.

The above products are supported by a company called Optimized Systems Software, located in Cupertino, CA. OSS also markets a 16K disk-based Basic known as Basic A+ and an assembler in their operating system called EASMD. Lo and behold, Basic A+ and EASMD are so close to the original cartridge code that they even have the same bugs.

The Basic is just as slow, but it does have new commands for handling players and missiles and disk I/O. It is a big step up from the original Basic, but still needs work. I would like to see integer variables and something to speed up the execution?

"Tell me more about 'bytes'!"

Microsoft Basic

Atari Microsoft Basic is the Basic that Atari should have released initially. It is a 19K disk-based Basic. Add to that about 8K of DOS which must also be booted with it, and the result is 21K of user memory available for the programmer on a 48K system or only 13K on a 40K system.

That could be hard to live with. For instance, if you go into graphics 8, you have only 13K left on the 48K system, and only 5K on the 40K system. Still, Microsoft Basic is a very powerful and convenient language to use, and I have found few bugs in it. But don't get it unless you have 40 or 48K.

Microsoft Basic has integer variables which are very fast, PRINT USING for business applications, and 4- or 8-byte accuracy (whichever you select), which speeds everything up. It is very much like TRS-80 Basic or Applesoft. Best of all, it has several nice features for player-missile graphics, character set redefinition, and other Atari-specific capabilities.

I like it, and try to use it whenever I have to do anything serious in Basic. While the bootup process takes a while, the time saved in program development is worth it. Any professional developer should seriously consider Microsoft Basic.

A 16K single cartridge (yes, you can put 16K on a single cartridge, check the hardware manual for details) version of Microsoft Basic is planned, but some features, such as renumber or PRINT USING, may still have to boot in from disk. More on this later; things haven't settled down yet.

Microsoft has extremely good documentation which looks even better when compared to the original Basic document. It was this documentation that was responsible for the delay in delivering the product; the disks have been ready to ship for some time but the manuals weren't. Considerable time and effort have gone into them, and it shows. Good job.

Atari Macro Assembler/Editor

The Atari Macro Assembler/Editor is a very, very powerful disk-based assembler, which is a joy to work with. Light years beyond the original cartridge, it is extremely fast; it will completely assemble 100 pages of code in six minutes. It features support for independent files with Include, macros, systext files, and raw speed. I have discovered a few trivial bugs in it, but this is one product I can rave about without reservation. I have worked with it for more than four months and like it better each time I use it.

If you have any serious assembly language programming to do, get the Macro Assembler/Editor.

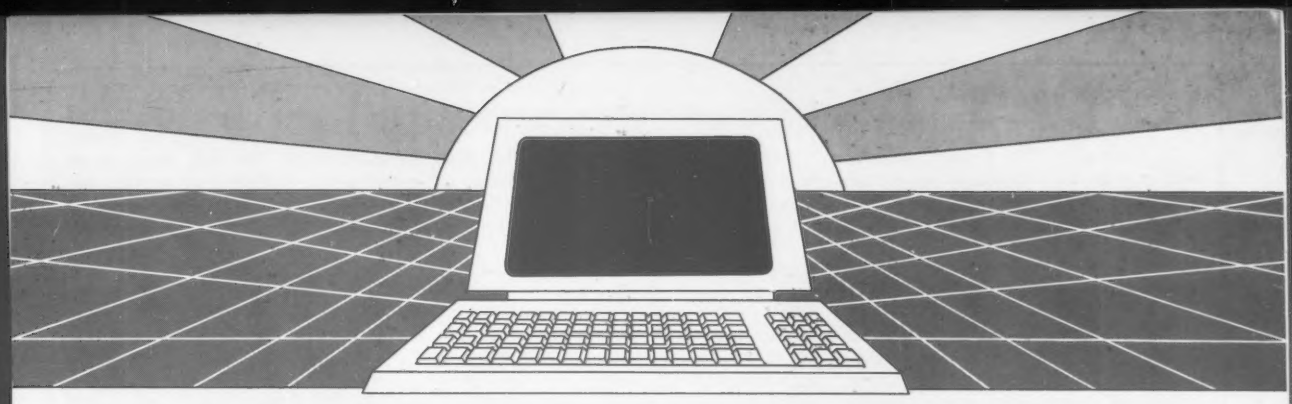
The Editor is also quite nice, and is being sold through APEX. It is a powerful and reasonably fast editor for developing text with no line numbers. This allows easy input of data, since you need not bother to strip off extraneous line numbers. Pascal, the assembler, and future goodies rely on the editor to generate source text.

Atari Pascal

Atari Pascal is brand new, and not reviewed yet. It is not a UCSD Pascal, but those of you who like Pascal might want to look it over and send me comments.

Atari Pilot

The Atari version of Pilot is a pretty clean implementation of the famous educational language. I have not done much with it but the feedback I have gotten is all good. The documentation in particular is extremely well done.



DISCOVER THE MAGAZINE THAT LAUNCHED THE MICROCOMPUTER INDUSTRY

Popular Electronics

Incredible as it may seem, *Popular Electronics* launched the microcomputer industry. Back in 1975, we published plans for building the world's finest microcomputer based on the 8080 cpu. These plans generated incredible excitement—and started the world thinking about personal computing.

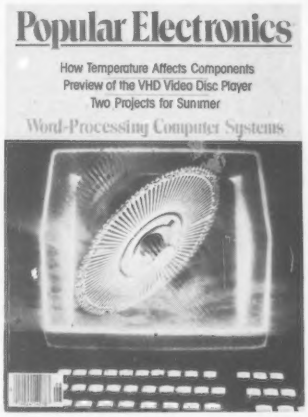
Popular Electronics always helps its readers experience the advances of the future—today. We do it with clearly written, in-depth articles explaining an innovation. Plans for building useful, low-cost projects incorporating the new technology. And reviews of mass-produced equipment when manufacturers finally catch on. Whether it's audio, video, computers, telephones, lasers or something that's just been invented, *Popular Electronics* will help you have fun with the newest, the most sophisticated, the most innovative electronics technology around.

Helpful buying guides

Popular Electronics compares and contrasts electronics gear in handy buyer's guide articles. We discuss features and options, what to look for, and how to get the best value on the market. Recent buyer's guide articles have covered computer printers, cordless home telephones, video cassette recorders, high-tech audio cassettes, video disc players, sophisticated telephones, projection televisions, pocket "beepers," video cameras and oscilloscopes.

World-famous test reports

In every *Popular Electronics* issue you'll find our famous in-depth test reports. We take a new electronics product, test it, and analyze the results. Recently we've tested *computers* (Apple, APF, Atari, Hewlett-Packard, IBM, Netronics, Ohio Scientific,


Popular Electronics
How Temperature Affects Components
Preview of the VHD Video Disc Player
Two Projects for Summer
Word-Processing Computer Systems

Radio Shack, Sinclair, Xerox), *software* (dBASE II), *audio equipment* (Bang & Olufsen, Crown, dbx, Hitachi, JBL, Mitsubishi, Optonica, Sansui, Yamaha), and *video* (GE, Hitachi, Pioneer, Panasonic, Quasar, RCA, Sharp, Sony, Technicolor, Toshiba, Zenith).

Innovative construction projects

If you're a do-it-yourselfer, you'll love the construction projects in *Popular Electronics*. Not only have we brought the world the 8080 microcomputer, but also projects for building the first low-cost modem. The first computer keyboard integrated with the computer (SOL). The first low-cost voice synthesizer. The first low-cost logic analyzer. A low-cost 1802-based microcomputer (ELF). An 1802-based EPROM programmer. An automatic line voltage regulator....

As you can see, our construction projects, while not terribly difficult, will keep you at the forefront of technological development—without your spending much money. And in the future, we'll be bringing you construction projects to help you get more from your computer, including ways to interface your microcomputer with new advances in radio, telephones and video!

Get the leader in the field—at up to 40% off!

Popular Electronics is the world's most widely read electronics magazine. Now you can subscribe at big savings—up to 40% off! At our New Subscriber rates, a one-year subscription is only $11.97. Take advantage of this offer—complete and return the coupon or postage-paid reply card today!

Popular Electronics P.O. Box 2774, Boulder, Colorado 80322

☐ **YES!** Send me one year (12 issues) of *Popular Electronics* for $11.97—I save 20%.

☐ I prefer two years for $19.97—I save 33%. ☐ Make that three years for $26.97—I save 40%.

Savings based on full one year subscription price of $15. 8H237

Mr./Mrs./Ms. _____
(please print full name)

Address _____ Apt. _____

City _____ State _____ Zip _____

CHECK ONE: ☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. 8H237

Outpost: Atari, continued...

Forth

To understand "Why Forth?" you must look at some basic programming philosophy. Many languages are unsuitable for serious software development work. For most high speed games, for example, even Microsoft Basic isn't fast enough. For business applications Pilot is out, and so on.

Well, Forth is difficult to describe, but let me try: it is a stack-oriented language which you define yourself. You start with a basic set of commands (input, output, arithmetic), and define your own commands (called words) from there. The language executes extremely quickly, compared to everything except assembler, and once you get into it, is much easier to write and debug, which drastically cuts development time.

Assembly language provides the ultimate in speed and machine control, but is not much fun to work with. Even with the very good macro assembler, debugging assembly code (especially without very good debug tools) is a frustrating, time consuming process. Forth helps the user get away from that.

The Atari is a very good machine for Forth. There are so many unique hardware features that a generic language such as Basic isn't good at handling them all, but Forth is.

You can define language commands to deal with players and missiles, character sets, vertical blank interrupts, and whatnot. Each user's Forth thus ends up growing along with him.

Sandy and I had been thinking of going to Forth, but it seemed like too much effort to get started. There were even two Atari Forths on the market: QS Forth and Pink Noise Forth. Yet I had a difficult time following QS Forth, even with its reasonably good instructions, and it seemed more a generic Forth implementation than an Atari-specific Forth. So we waited.

Two things changed our minds: 1) The book *Starting Forth* by Leo Brodie, from Prentice-Hall, which is simply superb and easy to read (complete with really, really good illustrations), and 2) VALForth, a new Forth based on figForth, which is currently being sold by APEX.

VALForth has commands designed especially to take advantage of the features of the Atari. It also includes a character set editor, easy player graphics, a very nice screen editor, and several other useful features. We were shown a preliminary version, and after reading the *Starting Forth* book, could dive in immediately and do things.

The transition is reasonably painless, and the power of the language unfolds around the user; I'm very happy to be working in it and we plan to write our next game in VALForth. The stack orientation is easy to get used to, especially if you just consider the stack data as part of the instruction set format.

The development speed of Forth has not been overlooked by Atari. Atari's Coin-Op group has a semi-legendary "Coin-Op Forth" which is supposed to be quite something to use. The Atari demo disk with the "Disco Dirge" background music is all "coin-op Forth." Rumor also has it that many of the new Coin-Op games are written in Forth (Battlezone, for one). This wouldn't surprise me; it's a powerful language.

As a point of philosophy, we feel that as Atari programmers we began in Basic, moved to 6502 Assembly for speed, and now, after experiencing assembly debugging, are moving to Forth to reduce the amount of time we must spend on programming. We have great hopes for VALForth and what we have seen already is very worthwhile.

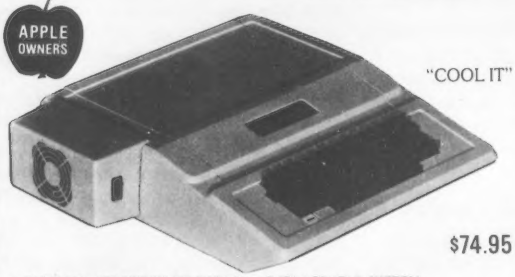
This brings us to the end of the July column. I hope you have enjoyed the sample programs and information. See you next month. □

SUPER RAM II
16K Language Card
With ROM SOCKET
$125.
2 Yr. Warranty
COMPUTER PRODUCTS
DESIGNING
MANUFACTURING
ELECTRONIC ENGINEERING

R. H. Electronics
566 Irelan, Bin CC
Buellton, CA 93427
(805) 688-2047

SUPER FAN II
FOR YOUR APPLE II COMPUTER*

APPLE OWNERS



$74.95

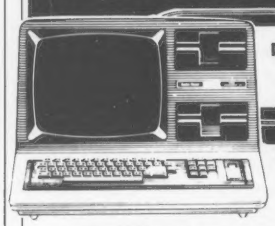
- CLIPS ON—NO HOLES OR SCREWS • REPLACEABLE SWITCH
- AVAILABLE IN 120V OR 240V AND 50/60HZ • DURABLE MOTOR
- REDUCES HEAT CAUSED BY EXTRA PLUG-IN CARDS
- INCREASED RELIABILITY—SAVES DOWN TIME AND REPAIR CHARGES
- TAN OR BLACK COLOR
- LOW NOISE DUE TO DRAWING EFFECT OF AIR THROUGH YOUR COMPUTER AND SPECIAL FAN AND MOTOR DESIGN
- "QUIETEST FAN ON THE MARKET"
- EXTRA 120V OUTLET FOR MONITOR OR ACCESSORIES TURNS ON WHEN YOU TURN ON YOUR FAN (NOT AVAILABLE ON 240V MODEL)
- SOLD WORLD WIDE • UNIQUE 1 YEAR WARRANTY

HOW TO HOOK IT UP: 1) Clip it on your APPLE. 2) Unplug your 120V cable (you won't need it). 3) Plug short 120V cable from Super Fan II to the back of your computer. 4) Plug the supply cable from Super Fan II to your 120V power source. 5) Turn on the rocker switch and a built-in, red, ready light comes on. 6) You are all set to "COOL IT.' This switch also turns your computer "off" and "on."

*Plus 6% California Sales Tax and $2.50 shipping charge per item.

CIRCLE 227 ON READER SERVICE CARD

DISCOUNT
TRS-80®



TRS-80 MODEL III
$2049 48-K 26-1066
$819 16-K 26-1062

TRS-80 MODEL II
$3279 64-K 26-4002

TRS-80 MODEL 16
$4925 128-K 26-6002

TRS-80 8.4 MEGABYTE HARD DISKS (PRIMARY UNIT) . . . $4000.

TRS-80 COLOR
$309 4-K 1001
$455 16-K 26-3002
$525 32-K 26-3003

WE HAVE COLOR DISK DRIVES 0—$475 1-2-3—$315

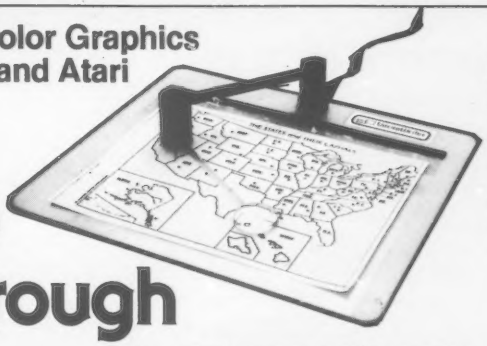
WE ALSO CARRY EPSON AND OKIDATA PRINTERS, XEROX 820 AND ALTOS COMPUTERS.
NO OUT-OF-STATE TAXES. T.M. TANDY CORP.
Sold with the manufacturer's limited warranty. Copies of such warranty may be obtained for review from Perry Oil and Gas Co.

PERRY OIL & GAS INC.
Dept. No. H-8 137 NORTH MAIN ST., PERRY, MICHIGAN 48872
PHONE (517) 625-4151, MICH
DEALERS' INQUIRIES INVITED.
WE ACCEPT CERTIFIED CHECKS, CASHIERS CHECKS AND MONEY ORDERS.
FOR OUR PRICES, PLEASE CALL TOLL FREE
1-800-248-3823

CIRCLE 212 ON READER SERVICE CARD

High-Resolution Color Graphics for the Apple and Atari

Graphics Breakthrough



How many programs have you written that would benefit from animated high-resolution graphics? Probably several. It is this kind of dramatic graphics that distinguish outstanding programs from ordinary ones. But if you've ever agonized for hours or days just to get one image perfected, you're probably not anxious to do it again. Now there's a better way.

New Graphics Entry System

Today there is a new graphics system available that is not only amazingly user-oriented but surprisingly economical. Called VersaWriter, it starts with an ingeniously simple entry board consisting of a 14" X 12" high impact plastic bed with a tough clear plastic overlay sheet. The original drawing or diagram is fastened with masking tape to the plastic bed and then covered with the clear sheet. Instead of using a light pen or complicated electronic X-Y head, the VersaWriter uses a double jointed arm attached to the top of the entry board at one end and a magnifying lens with crosshairs at the other end. The VersaWriter resembles a draftsman's pantograph on a smaller scale.

At each joint in the arm of the VersaWriter is a potentiometer. A cable from these pontentiometers connects to the paddle input of the computer. No special interface electronics or board is needed. Since the arm of the VersaWriter bends only in one direction, each point on the plotting head corresponds to a unique set of resistances on the potentiometers. All that's needed now is software to translate these resistances into usable screen coordinates.

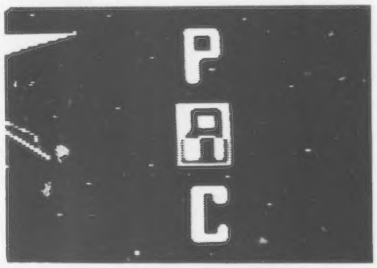
Exceptionally powerful software

It is in the software where VersaWriter really stands out. VersaWriter comes with two full disks of user-oriented software. First it has sets of "low level" commands for entering, creating and copying drawings and diagrams. Secondly, it has extensive sets of application routines for moving, enlarging, rotating, coloring or animating drawings that the user has created.

Graphics Systems

Versa Writer	**$299.00**
Kurta Graphics Tablet	**695.00**
Summagraphics Digitizer	**745.00**
Houston Instruments Hi Pad	**795.00**
Apple Graphics Tablet	**795.00**

Of course the basic commands let you enter a drawing freehand or by tracing it. Want a wider brush stroke? Six widths are available. Drawings can be independently scaled in both the vertical and horizontal directions. An enclosed shape may be filled in with any of 106 colors. No, that is not a misprint—By the same technique that a printing press can create hundreds of colors from the three primary ones, so can VersaWriter.



Here a shape (the letter A) is being scanned. After putting it in a shape table it may be used in other programs.

From the shape table, a shape (the letter A) may be enlarged, rotated, colored or moved about the screen.

Create Animation for Other Programs

The shapes you create with VersaWriter can be used and manipulated with ease in other programs. Up to 255 shapes can be entered into a shape table. These shapes may then be placed on the screen in any position or may be overlaid on a full or partial screen image. Animation is produced easily by moving about a portion of the image created by VersaWriter. For example, by alternating between two images of an airplane propeller it will appear to be spinning.

Other VersaWriter software includes text-writer with which text can be added to graphics. Upper and lower case, choice of color, text size, direction and starting point all may be specified.

The Area/Distance program lets you calculate distances (or perimeters) by entering a scale and tracing a shape or map route with the drawing arm. Areas of figures, open and irregular, can be similarly calculated.

The software also includes sets of electronic and computer logic shapes. In addition, an entire disk of dramatic demonstration graphics is included. These twelve full-screen graphics run the gamut from a fully labeled cross section of a human skull to colored maps to animated cartoons to an electronics schematic.

Software Updates

You may have read a review of VersaWriter that indicated that the color fill routine was slow. It was. But not any more. Several routines and improvements were added to the VersaWriter software since its introduction. An added feature, the Expansion Pac, is also now available. This third disk of software contains an area distance program, a microscope feature, and will save your graphics in the exact colors you prefer. It also includes shape tables for architecture, plumbing, electrical, circuit boards, landscape, chemistry, games, and more; 350 predefined shapes in all.

At Peripherals Plus, we evaluated every graphics device. We wanted to handle the best one regardless of price. VersaWriter has the best performance bar none. Surprisingly, it also has the lowest price, just $299.00 for the Apple version. It requires an Apple II Applesoft in Rom (or an Apple II Plus), disk, and 48K memory. VersaWriter comes complete with two disks of software, a comprehensive instruction manual, and a 90-day limited warranty. The additional Expansion Pac is available for $39.95.

The Atari version, which varies slightly from the Apple version in number and types of functions performed, is available for $299.00. As new updates are developed for the Atari, Peripherals Plus will furnish them free to all customers—just send us the disk and we'll supply the updated material. We make this unique offer because it is in our best interest to have you make the best use of your computer. We're also convinced that if other people see your VersaWriter in use they'll want one too.

Try VersaWriter for 30 days. If you are not completely satisfied we'll give you a prompt and courteous refund of the full price plus shipping both ways.

To order, specify Apple or Atari version. Send payment* indicated plus $3.00 postage and handling to Creative Computing, Dept. C722, 39 E. Hanover Avenue, Morris Plains, N.J. 07950. Orders may also be charged to your Visa, MasterCard or American Express account—by mail include credit card name, number and expiration date, of if you prefer, use our 24 hour toll-free number, 800-631-8112. In NJ only 201-540-0445.

*NJ residents add 5% sales tax.

For spectacular graphics on your computer, order VersaWriter today.

Peripherals Plus

Apple is the registered trademark of Apple Computer, Inc

images...ibm images...ibm ima

Will Fastie

Things are starting to warm up.

I now have a stack of programs (with their manuals, of course) that's about a foot tall. My press release file (pile?) is growing, and I'm getting more unsolicited information, which simply means my visibility is increasing. These are all encouraging signs for you because my information flow becomes your information flow. These are depressing signs for me because it raises my workload without a corresponding increase in my compensation. Maybe I should take in laundry on the side.

In the April issue of *Creative*, Stephen Gray recommended that the readers of his TRS-80 Strings column also read the other columns. He pointed to the similarity of the Basic for each machine, plus the benefit of knowing something about the other computers. He makes a very sensible point with which I agree. I did get a chuckle as I read "Keep your eyes on the IBM column, which may just have some programs you can pick up..." because I knew what I was putting together for this column. You'll see what I mean later on.

This will be another month of free form. I've decided not to embarrass myself by showing you my graphics screen dump program until I can test it. My problem is a lack of printer graphics, which I hope to resolve soon. I hope the programs I have included, though simple, will be interesting to you.

W. H. Fastie, 7110 Sheffield Road, Baltimore, MD 21212. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided.

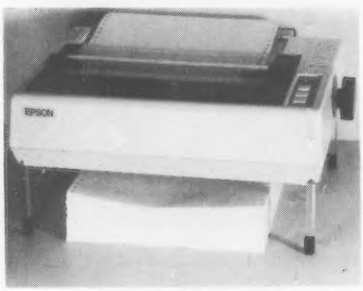


Photo 1. "Leggs" for Epson printers, from Argus, Inc.

New Hardware Products

I really have a great deal of respect and admiration for inventors who come up with simple, elegant, and powerful ideas. A firm in Baltimore named Argus, Inc., has come up with the simplest stand for the Epson printer yet: a set of long legs. Called Epson 'Leggs,' these legs are inserted in the holes at each corner of the printer base and raise the entire unit about 3" or so, just enough so that a stack of paper can be placed under the unit. That's all the other stands do, but the advantage is price.

A set of these legs costs $9.75 when ordered directly from the manufacturer. The other stands cost about $25 to $30, and the IBM stand is $55 list. The legs are shown in Photo 1. The address of the firm is at the end of the column.

Note: the legs are for the MX-80, but not the MX-70 or MX-100. I've tried them, and they are very clever indeed.

The next significant product is something called SemiDisk, from SemiDisk Systems. I'm a little light on information, but the device is a memory card with 512KB. It is not an expansion board, though. It is a disk emulator.

The manufacturer provides software so that the memory appears to be a floppy disk, but one that runs much, much faster. More than one board can be installed, and a bigger board provides 1 megabyte of storage.

This product should be of interest primarily to those who need very fast access to large amounts of data. SemiDisk costs $1995 for 512KB in the S-100 configuration—a high price for this amount of storage. It was not yet available for the IBM PC at the time of this writing.

IBM has also announced something related to the IBM Personal Computer, although not actually for the system. They have announced the IBM 7535 Manu-

"Only VR Data can offer you a Winchester Hard Disk Drive for your IBM Personal Computer...

...with the same level of excellence and state-of-the-art technology you'd expect from IBM."

Warren Rosenkranz, President, VR Data

We are tremendously impressed with the IBM Personal Computer. When we set out to increase its capability with our exclusive, totally compatible Winchester Hard Disk Drive and Memory Board, we dedicated ourselves to making the very finest products possible. Some very knowledgeable dealers and users say we've totally succeeded. See for yourself!!

As with our Winchester Hard Disk Drive, all our designs are tested, re-tested and "burned in." We're so sure of our quality control that we offer an unconditional 120 day extended warranty covering full costs of parts and labor on all VR Data products.

Inquire about our new Master Dealer program.

OTHER QUALITY PRODUCTS FROM VR DATA

Winchester Hard Disks
6.3 Megabytes
9.6 Megabytes
19.0 Megabytes
2x 6.3 Megabytes
2x 9.6 Megabytes
2x 19.0 Megabytes

Memory Boards with Error Correction
64 Kbytes 192 Kbytes
128 Kbytes

In The Queue
D-Con Direct connect internal modem
The Echo Winchester Backup

Insist on the best.
Ask for us by name.

VR data

777 Henderson Boulevard N-6 Folcroft, PA 19032 800-345-8102

MICROCOMPUTER EXCELLENCE SINCE 1972

CIRCLE 255 ON READER SERVICE CARD

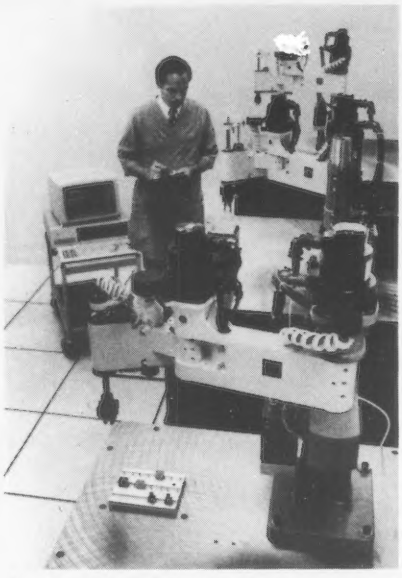


Photo 2. An IBM Personal Computer is used to develop programs for the IBM 7535 Manufacturing System.

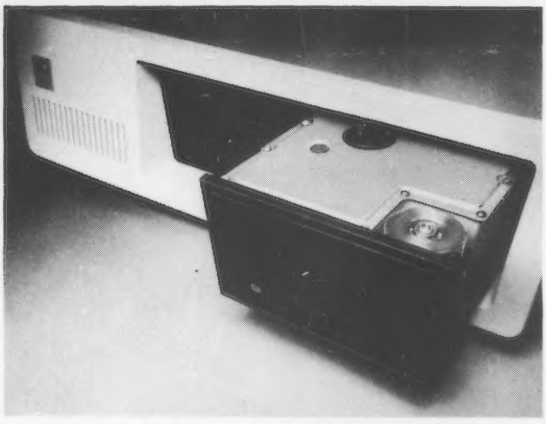


Photo 3. Davong Systems' DSI-501 5MB, 5 1/4" Winchester disk. Software for integration with IBM DOS is included.

facturing System, a robot arm. The 7535 can be programmed using a programming language called AML and where do you think this program development is done? The IBM Personal Computer, of course! Once the program has been loaded into the arm the Personal Computer can be detached and used for some other purpose. Photo 2 shows the system.

One hardware announcement has nothing to do with the IBM, but reflects the opinion that the IBM is a signficant market force. It is the MetaCard from Metamorphic Systems, Inc. This is an 8088 processor card with memory for the Apple II computer. It even allows MS-DOS (Microsoft's name for the IBM DOS) to run on the Apple, as well as CP/M-86 and UCSD Pascal version 4. CP/M-86 is supplied with the $980 product, and the other operating systems are optional.

Finally, Davong Systems has shaken things up by announcing their DSI-501 hard disk drive. List price: $1995 for five megabytes of storage, interface, power supply, and software. The drive is shown in Photo 3. Of course, the price of this unit is very interesting, the lowest I know of so far.

What's more interesting to me is that the price includes software support for IBM DOS. Most of the hard disks I know about have been announced with CP/M-86, and some of the disk vendors are even offering that operating system since IBM has yet to announce it.

Davong seems to be unique in this regard—I think to their advantage. They are also supporting an operating system called Qunix from Quantum Software Systems. The Davong press release called Qunix a "multi-user, multi-tasking system at a very low cost." I'll know more about the disk next month.

A comment about hard disks. There are quite a few companies jumping into the IBM market with disk drives, and the lure of 30 times the capacity of diskette drives is very tempting. Unless you have critical need for such capacity now, I advise patience.

The fact is that the market simply cannot sustain 20 or 30 disk subsystem manufacturers. If you can wait for a little while some of these companies will drop out and the leaders will emerge. IBM should also come bounding in soon, and I think it will be important to see what their unit looks like.

The goal is to get the most standard device possible, so there is no danger of software incompatibility. By the way, I haven't said too much about hard disks yet, because I am waiting too. I am in the process of getting some drives to evaluate, so you'll hear more as time goes on.

Cover Competition

Last month I mentioned three companies who manufacture dust covers for the IBM PC. They are TecMar, CompuCover, and Cover Craft. The Cover Craft covers came late this month, so I have tried them but haven't used them for long. They are made of a translucent, anti-static vinyl material and are well-made. All the seams are rolled so there is additional thickness where the material is stitched.

The cover for the IBM display and system unit fits well, although it is a little snug and requires the monitor to be positioned just so. The keyboard cover is nice, but it does not have a slit on the rear for the cable and as a result does not fit perfectly. Cover Craft's printer cover, however, fits like a glove. Considerable attention has been paid to its design.

I used both the TecMar and the CompuCover covers on my system over the last month. The TecMar covers are unacceptable, because they attract dust like a magnet. This news is a blessing in disguise, since these covers are the most expensive. By comparison, not a trace of dust could be found on my CompuCover set.

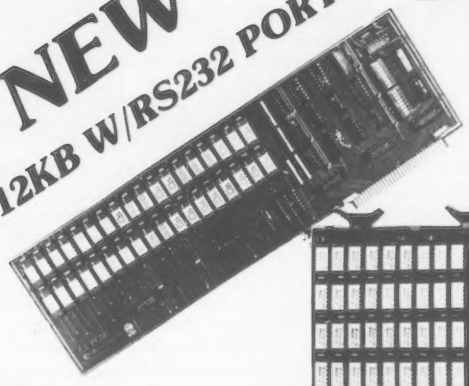
I have not seen the CompuCover printer cover, but other than that, I call it even between CompuCover and Cover Craft. The products from both companies are well made. Best fit for the system unit goes to Cover Craft. Best fit for the keyboard is CompuCover, hands down. CompuCover will have to work hard to match the Cover Craft printer cover, though.

Now, with all that digested, what is my preference? Well, I really like the

NEW
512KB W/RS232 PORT

YOU CAN'T KEEP A GOOD MEMORY DOWN

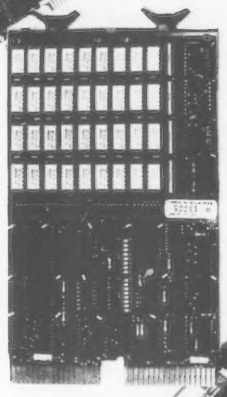
EXCEPT IN PRICE AND AT CHRISLIN WE PROVE IT!

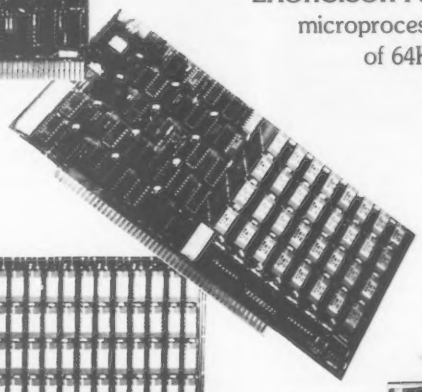


We offer new super competitive memory prices for your LSI 11, Motorola, IBM PC, S100, and Multibus microprocessor based systems.

Our CI-S100 64KB single card is compatible with most S100 bus systems.

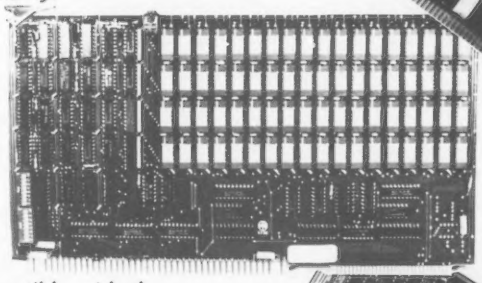
The CI-6800/2 expansion memory for EXORCISOR I and EXORCISOR II microprocessors has a capacity of 64KB on a single card, parity is standard.



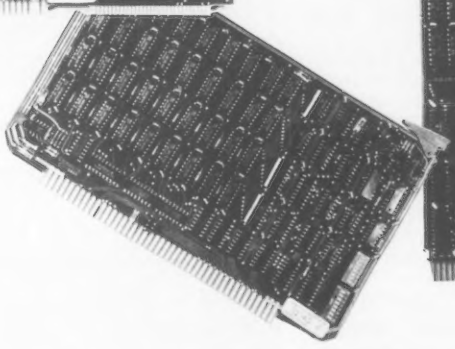


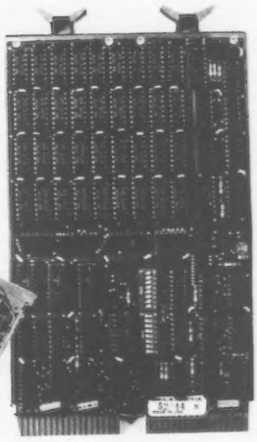
Our new add-in expansion memory for IBM's Personal Computer has capacity up to 512KB on a single card with one RS232-C port and parity.

The CI-1123 add-in memory has capacity up to 256KB on a single board, parity is standard.



The CI-8086 is compatible with the Multibus 8 bit and 16 bit microprocessors. The memory has capacity up to 512KB on a single card, and parity is standard.





DON'T ASK WHY WE CHARGE SO LITTLE, ASK WHY THEY CHARGE SO MUCH.

Chrislin Industries, Inc.

31352 Via Colinas • Westlake Village, CA 91362 • 213-991-2254
TWX 910-494-1253 (CHRISLIN WKVG)

CIRCLE 119 ON READER SERVICE CARD

CompuCover covers because of the nice color and feel of the cloth-backed vinyl. I am using the Cover Craft printer cover because it is so well made.

IBM Service

I got a letter in the mail this month advising me that my warranty was just about up and that I should consider a maintenance agreement with IBM. I learned a disturbing fact. The letter informed me that if I did not take an agreement with IBM, I could only get IBM service by mailing my unit to Greencastle, IN, because IBM does not offer walk-in service.

I didn't realize that. IBM just lost any chance of getting my service business, since I have a very respectable Computerland store which is only too happy to see me walk in with a broken computer for time and materials repair.

By the way, IBM is charging $179 for a one year, pick-up/delivery service agreement for the Epson Printer. I won't tell you not to buy this contract, but everyone tells me that Epson printers simply do not break. My personal experience bears this out, as none of the people I know with Epsons have ever required repair. It sounds like $179 is a little high.

IBM Program Submission Plan

If you have considered submitting a program to IBM, then you have probably already taken the first step of writing away for their information packet. I got one to see what it was like, and to learn what the "deal" is.

The packet contains two agreements. The first is an agreement for submission of the program. The form is used to describe your product, establish the relationship between your employer, you, and the software package, and also includes some "specific provisions." Most of these are routines.

Watch out for paragraphs 3, 4, and 6. Paragraph 3 says that you agree to enter into an acceptance agreement if your submission is accepted. In effect, the agreement to submit binds you to accept if IBM does. However, the entire agreement is worded to clearly indicate that IBM can do whatever it pleases with the program. I read it as saying that even if they accept it, they do not necessarily have to market it.

Paragraph 4 says that, except as protected by patent claims and copyright laws, IBM can disclose any material submitted as they choose.

Paragraph 6 says IBM may "make, procure, or market" something that competes with your program. This agreement also calls out that IBM will only be liable to $100,000 in the event a controversy arises over the agreement.

The second agreement is the Acceptance Agreement. If you are in the process of executing one of these, it means IBM has accepted your submission. The agreement is broad. First, you will be paid an advance royalty of $250. You will be paid 15% of IBM's revenue for the product (Watch it: IBM's revenue may be 40% of list price) to a maximum of $100,000, and payments are quarterly. The royalties are terminated after four years. The term of the agreement is at least 75 years. You must provide maintenance for your program for four years, and must send IBM, within one month, any changes you make to the program. Maintenance of the program is at your expense.

This is a tough agreement. My advice is: don't bother. In the first place, if you have a really great program, why settle for $100,000? Do you think VisiCalc has a $100K ceiling? Ha!

In the second place, the agreement is not balanced and favors IBM at every turn. They certainly have a right to protect their interests, but you must protect yours as well. I think you give away too much when you sign this piece of paper.

Here's my best piece of advice: don't listen to me. Have your attorney look it over for you. What do I know about the law, anyway?

Publications

I really like *Creative Computing*, and I'm glad to be writing for it. I have always found it to be my best source of information. However, there are some other publications that will be of particular interest to IBM PC owners.

The first is *PC*, "The Independent Guide to IBM Personal Computers." The charter issue is the February/March 1982 issue, and the magazine will be published bi-monthly. It was 100 pages, including covers, and I thought it was a competent job. It is professionally done with good graphics and lots of color, and the writing is good. I thought the cover was striking.

The second is *Personal Computer Age*, "The Definitive Journal for the IBM Personal Computer User." It will be published monthly. The February issue was 32 pages. I think the journal is a little light. Much of the content of the first two issues was not particularly original, coming from IBM documentation. The writing leaves a little to be desired.

There are two very good features of the publication. The first is a section called "Problem Reporting." Ten dollars is offered if you are the first to report a bona fide bug or problem. It's an excellent way to encourage a flow of this kind of information.

Listing 1. Basic version of the ROMCHAR program.

```
100 ' ROMCHAR - display dot matrix characters from ROM patterns
110 ' Will Fastie -- Revised 24 March 1982
120 DEFINT A-Z
130 DIM COLMASK(8)
140 FOR I = 0 TO 7: COLMASK(I+1)=2^(7-I): NEXT I
150 DOTCHAR=219
160 DOTSIZE=1
170 DOT$=STRING$(DOTSIZE,DOTCHAR)
180 GOSUB 490
190 DEF SEG=&HF000
200 BASEADR=&HFA6E
210 BYTESPERCHAR=8
220 KEY OFF
230 ' Main loop
240 CLS
250 CHAR$=INKEY$: IF CHAR$="" THEN 250
260 IF CHAR$=" " THEN CLS: END
270 CODE=ASC(CHAR$)
280 IF CODE >= 128 THEN BEEP: GOTO 230
290 ADR = BASEADR+(CODE*BYTESPERCHAR)
300 CLS
310 X=8
320 Y=(SCREENWIDTH-(8*DOTSIZE))/2
330 GOSUB 350
340 GOTO 250
350 ' Subroutine to display character
360 FOR ROW=1 TO 8
370   ROWVAL=PEEK(ADR+(ROW-1))
380   FOR COL=1 TO 8
390     COLMASK=COLMASK(COL)
400     IF (ROWVAL AND COLMASK) <> 0 THEN GOSUB 450
410   NEXT COL
420 NEXT ROW
430 LOCATE 1,1
440 RETURN
450 ' Locate to bit position and display giant pixel!
460 LOCATE X+(ROW-1),Y+(COL-1)*DOTSIZE
470 PRINT DOT$;
480 RETURN
490 ' Initialize display
500 SCREENWIDTH=80
510 RETURN
```

WE WILL NOT BE UNDERSOLD

CP/M® Software

Micropro

WordStar	$319
Customization Notes	$489
Mail-Merge	$109
WordStar/Mail-Merge	$419
DataStar	$249
WordMaster	$119
SuperSort I	$199
Spell Star	$175

Microsoft

Basic-80	$289
Basic Compiler	$329
Fortran-80	$349
Cobol-80	$574
M-Sort	$124
Macro-80	$144
Edit-80	$ 84
MuSimp/MuMath	$224
MuLisp-80	$174

Unicorn

Mince	$149
Scribble	$149
Both	$249

Data Base

FMS-80	$649
dBASE II	$595
Access/80	$699

Pascal

Pascal/MT+	$429
Pascal/M	$189

Miscellaneous

SpellGuard	$299
The Last One	$549
SuperCalc	$269
CBASIC-2	$ 98
MicroStat	$224
StatPak	$449
Micro B+	$229

Apple Software (Business)

Micropro

Wordstar	$269
MailMerge	$ 99
Wordstar/MailMerge	$349
SuperSort I	$159
Spellstar	$129

Visicorp.

Visicalc 3.3	$229
Desktop/Plan II	$229
Visiterm	$139
Visidex	$229
Visiplot	$185
Visitrend/Visiplot	$275
Zork	$ 34

Miscellaneous

Micro Courier	$219
Super-Text II	$127
ASCII Express	$ 59

Apple Software (Entertainment)

Wizard & Princess	$ 28
Mystery House	$ 24
Flight Simulator	$ 29

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require one to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

Personal Software (cont.)

Raster Blaster	$ 26
Space Eggs	$ 26
Sargon II	$ 29
ABM	$ 22
Micropainter	$ 29
Apple Panic	$ 28
Pool 1.5	$ 26

Apple Accessories

Z-80 Softcard by Microsoft	$299
Keyboard Enhancer	$119
Apple Joystick	$ 49
Sup-r Mod	$ 25
CPS Multifunction Card	$169
Videoterm by Videx	$249
16K Card by Microsoft	$159
Sup-r Fan	$ 39
ALF9 Voice Board	$159
CCS Cards	$Call
CCS Parallel Model 7720	$Call
CCS Serial Model 7710D	$Call
CCS Centronics Model 7728	$Call

Disk Drives For TRS-80* Model 1

CCI-100 5¼", 40 Track	$ 299
Add-ons for Zenith Z-89	
CCI-189 5¼", 40 Track	$ 389
Z-87 Dual 5¼" system	$ 995
Drives for Z-90	$Call

External card edge and power supply included. 90 day warrantyfone year on power supply.

Corvus 5M	**$ 3089**
Corvus 10M	**$ 4489**
Corvus 20M	**$ 5429**
Corvus Mirror	**$ 699**
Shugart 8" 801R Raw Drive	$ 399
TANDON 5¼" Raw Drive	$ Call
Power Supplies	$ Call

Diskettes—Box of 10

Maxell 5¼"	$ 40
Maxell 8"	$ 45
BASF/Verbatim 5¼"	$26.95
BASF/Verbatim 8"	$ 36
Plastic File Box—Holds 50 5¼" dskts.	$ 19
Plastic Library Case 5¼"	$ 3
Plastic Library Case 8"	$ 4
Head Cleaning Diskette	$ 25
Floppy Saver	$10.95
Floppy Saver Rings	$ 6.95

16K RAM Kits

One Kit	$19.00
Two Kits	$37.00
200ns for TRS-80*, Apple II, (specify): Jumpers	$ 2.50

Computer Systems

Atari 400	$ 359
Atari 800	$ 699
Call for other Atari products	
Zenith Z89, 48K	$ Call
Zenith Z90, 64K	$ Call
Call for other Zenith products	

Dealer (National/International) Inquires Invited
Send for FREE catalogue

Terminals

ADDS Viewpoint	$ Call
Zenith Z-19	$699
Televideo 910	$595
Televideo 920C	$769
Televideo 950	$ 969

S-100 California Computer Systems

Mainframe	$ 359
Z80 CPU	$ 239
64K RAM	$ 569
Floppy Disc Cntrl	$ 339
Integrated Sys. w/int. cables, tstd.	$1999
2P + 2S I/O	$ 269

Casio Calculators

Pocket Comp.	FX702	$185.00
Desk Printr/Calc.	FR100	$ 79.95
Scientific Calc.	FX8100	$ 49.95
Game Watch	CA90 Plastic	$ 49.95
Game Watch	CA901 Steel	$ 69.95
Calendar Watch	AX210	$ 59.95

Printers **NEC Spinwriter**

7710 R.O. Ser	$2395
7710 Ser w/tr.	$2595
7720 KSR w/tr.	$2795
7730 R.O. Par	$2395
7730 R.O. Par w/tr.	$2595
NEW 3500 Series	**$ Call**
Epson MX-70	**$ Call**
Epson MX-80	**$ Call**
Epson MX-80FT	**$ Call**
Epson MX-100	**$ Call**
Epson Graftrax	**$ Call**
PaperTiger 560 Gr. & 2K	$ Call
IDS Prism 80	$ Call
IDS Prism 132	$ Call
PaperTiger Access.	$ Call
Olivetti DY 211 Daisy Wheel	**$ Call**
Okidata Microline 80 Fric. & pin feed	$ Call
Okidata Microline 82A Fric. & pin feed	$ Call
Okidata Microline 83A 120 cps	$ Call
Okidata 84 200 cps	$ Call
Centronics 739	$ 739
Data South 180 cps	$ Call

Monitors

Leedex 12" B&W	$ 119
Leedex 12" Green Screen	$ 129
Leedex 13" Color	$ 329
Sanyo 9" B&W	$ 169
Sanyo 9" Green Screen	$ 179
Sanyo 12" Green Screen	$ 249
Sanyo 12" B&W	$ 245
Sanyo 13" Color	$ 469
Zenith 13" Color	$ 349

****** Special of the Month ******
Zenith 12" Green Screen
$119

Telecommunications

Prentice Star Modem 1-yr. guar.	$ 125
Novation Cat	$ 139
Novation D-Cat	$ 149
Novation Auto-Cat	$ 199
Novation Apple Cat II	$ 299
Hayes Smart Modem™	$ 249
Hayes Micro-Modem II™	$ 295
Hayes Chronograph™	$ 225
CCI Telnet Com. Package	$ 135

The CPU Shop

420-438 Rutherford Ave., Dept. KO4M Charlestown, Massachusetts 02129
Hours 9 AM - 9 PM (EST) Mon.-Fri. (Sat. till 7)

To Order Call Toll Free 1-800-343-6522
Technical Information call 617/242-3361

TWX: 710-348-1796
Tandy Corporation Trademark/® Digital Research

Massachusetts Residents call 617/242-3361
Massachusetts Residents add 5% Sales Tax

CIRCLE 144 ON READER SERVICE CARD

IBM, continued...

The second is the directory at the end of the magazine. This lists software and hardware vendors, services, publications (except they did not mention my column), and clubs and users groups. This list has already helped me and can be very valuable if you are looking for something in particular. I encourage *Personal Computer Age* to continue this section, no matter how big it gets.

There is a new book out from Que Corporation called *IBM's Personal Computer*. It has 303 pages and costs $14.95. I think it's very good, especially for someone considering the purchase of a personal computer of any kind, but who is not sure how the IBM machine fits in the scheme of things. I'm pretty well-informed, but the book had some surprises for me, too. I recommend it.

Software

I had a lot of fun with my system over the last month, which is unusual. For the most part, I haven't done too much playing with my machine. When I have the time to fool with it, it's a word processor and these columns are in progress. What got me fired up was the arrival of *PC/Forth* from Laboratory Microsystems.

Forth is, well, uh... umm... well, interesting. At the risk of inflaming Forth devotees, I'll say that Forth is a programmer's programming language. Its power lies in the fact that it gives the programmer total control, and that's also the danger. As you can see from my listings, Forth is not for the faint of heart.

I found *PC/Forth* to be complete and pretty well thought out for the IBM PC. There were a few bugs, but Ray Duncan, who *is* Laboratory Microsystems, promptly repaired the system and sent me an update. The documentation that comes with the system is meant for someone who understands Forth. You must supplement it with other materials if you are a neophyte.

Ray sent me a copy of Leo Brodie's "Starting Forth," which is a very good tutorial. It has the small problem of speaking in one variant of Forth, while *PC/Forth* is the other variant. *PC/Forth* is derived from Release 1.0 of fig-Forth's 8086 version.

Although *PC/Forth* is the first language other than Basic that I have been able to test, I am anxious to review whatever tools are available for the IBM PC. I put together three rather simple programs which I intend to implement with each language system that I get. Let me describe the three programs. Listings 1 thru 6 are these programs written in Basic and Forth.

The first program is ROMCHAR. This is the program that was used in the March column to demonstrate memory access. The program also shows output to the display with cursor control.

Listing 2. PC/Forth version of the ROMCHAR program.

```
Screen # 30
  0 ( FORTH version of ROMCHAR
  1 FORTH DEFINITIONS DECIMAL
  2 : TASK ;
  3 : STACK.BITS 7 0 DO 2 /MOD LOOP ;
  4 : GET.CHAR KEY DUP BL = CLEARSCREEN IF QUIT ENDIF ;
  5 : GET.VAL  1+ 2DUP C@L ;
  6 HEX
  7 : CONVERT F000 SWAP 8 * FA6E + 1- ;
  8 DECIMAL
  9 : DISPLAY 7 + 36 SWAP GOTOXY
 10           8 0 DO IF 219 EMIT ELSE BL EMIT ENDIF LOOP ;
 11 : ROM.CHAR 0 0 GOTOXY GET.CHAR CONVERT
 12            8 0 DO GET.VAL STACK.BITS I DISPLAY LOOP
 13   ;
 14 : ROMCHAR CLEARSCREEN BEGIN ROM.CHAR AGAIN ;
 15
```

Listing 3. HILO game in Basic.

```
100 ' HILO - Guessing game.  Object is NOT to guess the number.
110 ' Will Fastie -- 22 Feb 82
120 PROG$="HILO v1.00 22-Feb-82"
130 KEY OFF
140 RANDOMIZE VAL(RIGHT$(TIME$,2))
150 ' Main program
160 CLS: PRINT PROG$: PRINT
170 GOSUB 220
180 PRINT
190 INPUT "Another game?  ([Y] or N)  ",ANSWER$
200 IF LEN(ANSWER$) = 0 THEN ANSWER$ = "Y"
210 IF ANSWER$ = "Y" OR ANSWER$ = "y" THEN GOTO 160 ELSE CLS: END
220 ' Game playing routine
230 HIGH = 100: LOW = 0
240 NUMBER = INT(99*RND)+1
250 ' Guessing loop
260 ROW = CSRLIN: INPUT "Your guess:  ",GUESS
270 LOCATE ROW,20
280 IF GUESS <= LOW OR HIGH <= GUESS
    THEN PRINT "is out of range!  You LOSE!": GOTO 330
290 IF GUESS = NUMBER THEN PRINT "is the number!  You LOSE!": GOTO 330
300 IF GUESS > NUMBER THEN HIGH = GUESS: PRINT "is high.": GOTO 320
310 IF GUESS < NUMBER THEN LOW  = GUESS: PRINT "is low."
320 GOTO 250
330 RETURN
```

Listing 4. HILO game in PC/Forth.

```
Screen # 36
  0 ( HILO, by Will Fastie
  1 FORTH DEFINITIONS DECIMAL : GAME.HILO ;
  2 0 CONSTANT CONTINUE  1 CONSTANT GAME.OVER
  3 0 VARIABLE SELECTION
  4 0 VARIABLE HIGH  0 VARIABLE LOW
  5 HERE VARIABLE RND.X @DATE + @TIME + + RND.X @ + RND.X !
  6
  7 : RND RND.X @ 31421 * 6927 + DUP RND.X ! 99 U* SWAP DROP 1+ ;
  8 : GET.GUESS ( --- ) ." Your guess:  " #IN ;
  9 : ?OUTOF.RANGE ( guess --- guess f )
 10         DUP DUP HIGH @ >= SWAP LOW @ <= OR ;
 11
 12 : .ILLEGAL ." is out of range!  You LOSE!" ;
 13 : .CORRECT ." is the number!  You LOSE!" ;
 14 :      .LOW ." is low." ;  : .HIGH ." is high." ;
 15 -->


Screen # 37
  0 ( HILO continues )
  1 : CHECK.LIMITS ( guess --- f )
  2     ?OUTOF.RANGE
  3     IF .ILLEGAL DROP GAME.OVER ELSE DUP SELECTION @ =
  4     IF .CORRECT DROP GAME.OVER ELSE DUP SELECTION @ <
  5     IF LOW ! .LOW ELSE HIGH ! .HIGH ENDIF CONTINUE
  6         ENDIF ENDIF CR ;
  7
  8 : PLAY.HILO 100 HIGH ! 0 LOW ! RND SELECTION !
  9         BEGIN GET.GUESS CHECK.LIMITS UNTIL ;
 10
 11 : HILO  BEGIN
 12         CLEARSCREEN ." HILO  v1.00  25-Mar-82" CR CR
 13         PLAY.HILO
 14         CR ." Another game?  (Y or N)  " KEY 78 =
 15     UNTIL ;
```

YOUR MARKETPLACE FOR:

ATARI

HARDWARE • SOFTWARE

— SAMPLE DISCOUNTS —

	REG. PRICE	OUR PRICE
ADVENTURE INT'L		
Adventures 1-12 (T)	19.95	16.90
Mountain Shoot (T)	14.95	12.70
Rear Guard (T)	19.95	16.90
3D Tic Tac Toe (T)	19.95	16.90
ARCADE PLUS		
Ghost Hunter (T)	29.95	25.50
Pro Football (T)	29.95	25.50
ATARI INC.		
Caverns of Mars (D)	39.95	35.10
Missile Command (C)	44.95	39.50
Centipede (C)	44.95	39.50
Pac Man (C)	44.95	39.50
Technical User Book	29.95	26.30
AUTOMATED SIMULATIONS		
Crush, Crumble Chomp (T)	29.95	25.45
Ricochet (T)	19.95	16.90
DATASOFT		
Dung Beetle (D)	29.95	25.45
Text Wizard (D)	99.95	87.90
K-BYTE		
K-Razy Shootout (C)	49.95	43.90
ON LINE SYSTEM		
Crossfire (D) Atari--	29.95	25.50
Jawbreaker (D)	29.95	25.50
Frogger (D)	34.95	30.70
ROKLAND INC.		
Deluxe Invaders (D)	34.95	30.70
Gorf (D)	39.95	35.10
Wizard of Wor (D)	39.95	35.10
O.S.S.		
OS/A+or Basic, A+ (D)	80.00	70.40
VISICORP		
Visicalc (D)	250.00	219.00

800	Computer 16k	$689	Vortex Type & Talk	$323
800	Computer 32K	$765	Epson MX-70	$319
800	Computer 48K	$799	Epson MX80	$519
810	Disk Drive	$457	Epson MX100	$796
850	Interface	$179	Le Stick	$ 36
16K	Ram Module	$ 81	128K Ramdisk	$497
32K	Ram Module	$118	Eprom Burner	$187

NEARLY 1000 ATARI PRODUCTS IN OUR CATALOG

HOW TO ORDER: Send check or money order or call our toll free number and use your Visa Card. Shipping on software is $2.00 per order anywhere in USA. Hardware shipping call for cost. CA residents add 6% sales tax. Add 3% for VISA or MC. Equipment subject to price change and availability without notice.

Call or Write for

FREE

ATARI PRODUCTS CATALOG
with nearly 1000 items
at DISCOUNT prices

ORDER PHONE
1-800-235-5759

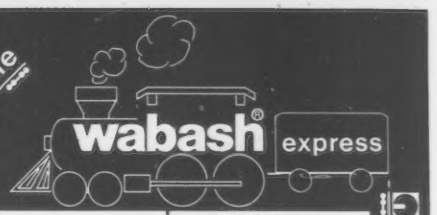
Phone for Information or Business 1-805-967-3889

ROYAL SOFTWARE 5138 Hollister Avenue
Santa Barbara, CA 93111

* Atari is Trademark of Atari Inc.

CIRCLE 230 ON READER SERVICE CARD

Ride the **wabash** express



5¼"	8"
$1.99* SINGLE SIDE SINGLE DENSITY W/HUB RING. SOFT. 10 OR 16 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE	$1.99* SINGLE SIDE SINGLE DENSITY. SOFT OR 32 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE
$2.19* SINGLE SIDE DOUBLE DENSITY W/HUB RING. SOFT. 10 or 16 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE	$2.49* SINGLE SIDE DOUBLE DENSITY. SOFT OR 32 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE
$2.99* DOUBLE SIDE DOUBLE DENSITY W/HUB RING. SOFT. 10 OR 16 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE	$3.09* DOUBLE SIDE DOUBLE DENSITY. SOFT OR 32 SECTORS. 100% CERTIFIED 2 YEAR WARRANTEE

*
- Minimum order 100 • For smaller quantities add 10%
- Packed 10 boxes of 10 diskettes with sleeves and labels
- Quantity discounts – 1,000 deduct 3%, 5,000 deduct 5%, 10,000 deduct 7%
- Add $5.00 per case 5¼", $7.00 per case 8" For shipping and handling Continential U.S.A., U.P.S. ground.

Box of 10 diskettes: 5¼" 8"
OPUS ss/sd $20 ss/sd $21
BASF ss/dd $23 ss/sd $24
MAXIWELL, DYSAN — TOO LOW TO QUOTE CALL
SPECIFY SECTORING WHEN ORDERING
5¼" QUAD DENSITY IN STOCK

DISK DRIVE HEAD CLEANING KITS
Prevent head crashes and ensure error-free operation
5¼" or 8" $19.50

HARDHOLE DISK PROTECTORS
Reinforcing rings of tough mylar protect disk hole edge from damage.
5¼" 8"
Applicators $3 $4
Hardhole Rings (50) $6 $8

SFD C- 10 CASSETTES .. 10/$7
(All cassettes include box and labels.)
Get 8 cassettes, C-10 Sonic, and Cassette/8 Library-Album, as illustrated, for only $8

LIBRARY CASES
8" Kas-sette/10 ..... $2.99
5¼" Mini Kas-sette/10 ... $2.49

5¼" or 8"
Vinyl Storage Pages ..... 10/$5

• Written purchase orders accepted from government agencies and well rated firms at a 10% surcharge (wabash media only) for net 30 billing. • International orders accepted with a 15.00 surcharge for handling, plus shipping charges. • C.O.D. requires a 10% deposit. • We accept Visa, Mastercharge, Money Orders, and Certificate checks. • Checks require bank clearances. • All shipments F.O.B. San Diego. • Minimum shipping and handling 2.00, minimum order 10.00. • California residents all 6% sales tax. • Prices and terms subject to change without notice. • All sales subject to availability, acceptance, and verification. • All sales are final. • Satisfaction guaranteed or full refund.

We also offer printer ribbons, printwheels, type elements, equipment covers, power consoles, paper supplies, storage and filing equipment, furniture and many other accessories for word and data processing systems. Write for our free catalog.

Toll Free Order Only
800-854-1555

For Information or California Orders
(714) 268-3537

ABM PRODUCTS
8868 CLAIREMONT MESA BLVD.
SAN DIEGO, CALIFORNIA 92123

CIRCLE 102 ON READER SERVICE CARD

IBM, continued...

The second program is a simple game I call HILO. Besides being simple, it has sentimental value because it is the first program I ever wrote, and in machine code on an NCR 500 (what?) to boot. It demonstrates control structures and interactivity.

The third program is a benchmark designed to provide a rough, unscientific measure of relative language performance. To be quite frank, it will really only give an idea how fast other languages are compared to Basic, although my forthcoming assembly language version of this program should represent something close to absolute best performance.

The results of the benchmark for Basic and *PC/Forth* are shown in Figures 1 and 2. Note that the Forth version ran with 30,000 iterations while Basic ran with 10,000. I don't have the floating point routines for Forth yet, so only the integer results are helpful. They indicate a performance ratio of 18 to 1 in favor of Forth.

I'm looking for other languages. In particular, I'm looking for the more esoteric ones, since we know the usual ones will be available. For example, let me know if you know of a Lisp, Snobol, APL, Pilot, or Sail for the PC. Other versions of C, Pascal, or Ada will be of interest also. Lest I give the wrong impression, I am interested to learn of the standard languages but I don't intend to review them unless they have some outstanding characteristic.

Figure 1. Benchmark results for IBM Basic.

```
 10000  iterations in loop.

Integer test
------------
Time started:  03:44:15
Time stopped:  03:44:45
Elapsed time:  00:00:30

Single Precision Floating Point Test
------------------------------------
Time started:  03:44:46
Time stopped:  03:45:23
Elapsed time:  00:00:37

Double Precision Floating Point Test
------------------------------------
Time started:  03:45:24
Time stopped:  03:46:10
Elapsed time:  00:00:46
```

Figure 2. Benchmark results for PC/Forth. Note 30,000 iterations as opposed to 10,000 for Basic.

```
30000 iterations in loop.

16-bit Integer test
-------------------
Time started:  03:29:18
Time stopped:  03:29:23
Elapsed time:  00:00:05

32-bit Integer test
-------------------
Time started:  03:29:23
Time stopped:  03:29:31
Elapsed time:  00:00:08
```

Listing 5. Basic benchmark.

```
100 ' BENCH - BASIC "number-crunching" performance test
110 ' Will Fastie -- 24 March 1982
120 PROG$ = "BENCH v1.00 24-Mar-82"
130 NRITERATIONS = 10000
140 DEF FNSECS(T$) = VAL(LEFT$(T$,2))*3600 + VAL(MID$(T$,4,2))*60
                     + VAL(RIGHT$(T$,2))
150 DEFINT I
160 KEY OFF: CLS: PRINT PROG$: PRINT
170 PRINT NRITERATIONS;" iterations in loop.": PRINT
180 TEST$ = "Integer test"
190 START$ = TIME$
200 FOR I = 1 TO NRITERATIONS
210   B% = B%+1
220 NEXT I
230 STOP$ = TIME$
240 GOSUB 400
250 TEST$ = "Single Precision Floating Point Test"
260 START$ = TIME$
270 FOR I = 1 TO NRITERATIONS
280   B! = B! + 1!
290 NEXT I
300 STOP$ = TIME$
310 GOSUB 400
320 TEST$ = "Double Precision Floating Point Test"
330 START$ = TIME$
340 FOR I = 1 TO NRITERATIONS
350   B# = B#+1#
360 NEXT I
370 STOP$ = TIME$
380 GOSUB 400
390 END
400 ' Subroutine to calculate and display results of test
410 PRINT TEST$
420 PRINT STRING$(LEN(TEST$),"-")
430 PRINT "Time started:  ";START$
440 PRINT "Time stopped:  ";STOP$
450 ELAPSED = FNSECS(STOP$) - FNSECS(START$)
460 HOURS   = ELAPSED\3600
470 MINUTES = (ELAPSED-HOURS*3600)\60
480 SECONDS = ELAPSED MOD 60
490 PRINT "Elapsed time:  ";
500 FORMAT$ = "##:##:##"
510 IF HOURS   < 10 THEN MID$(FORMAT$,1,1) = "0"
520 IF MINUTES < 10 THEN MID$(FORMAT$,4,1) = "0"
530 IF SECONDS < 10 THEN MID$(FORMAT$,7,1) = "0"
540 PRINT USING FORMAT$;HOURS,MINUTES,SECONDS
550 PRINT
560 RETURN
```

Listing 6. PC/Forth benchmark. Program tests both single and double precision integers.

```
Screen # 40
  0 ( BENCH by Will Fastie
  1 FORTH DEFINITIONS DECIMAL
  2 : BENCH ;
  3 ( Definitions of time routines )
  4 : SEXTAL 6 BASE ! ;
  5 : :00 # SEXTAL # DECIMAL 58 HOLD ;
  6 : HH:MM:SS ( dsecs --- )
  7     <# :00 :00 # # #> TYPE SPACE ;
  8 : TIME->SECS ( forth-time --- dsecs )
  9     >R 256 /MOD 60 * + 60 U* R> 256 /MOD SWAP DROP S->D D+ ;
 10 : .SHOWTIME ( dsecs --- dsecs )
 11     2DUP HH:MM:SS ;
 12 : .ELAPSED  ( dsecs1 dsecs2 --- )
 13     D- HH:MM:SS ;
 14 -->
 15

Screen # 41
  0 ( BENCH, continues )
  1 : DASHES ( n --- ) 0 DO ." -" LOOP ;
  2 10000 VARIABLE NRITERATIONS   0 VARIABLE B 2 ALLOT
  3 : INTEGERS-16 0 B ! NRITERATIONS @ 0 DO B @ 1 + B ! LOOP ;
  4 : INTEGERS-32 0 0 B 2!
  5     NRITERATIONS @ 0 DO B 2@ 1. D+ B 2! LOOP ;
  6 : .REPORT ( time1 time2 --- )
  7     TIME->SECS 2SWAP TIME->SECS CR 19 DASHES CR
  8     ." Time started:  "       .SHOWTIME CR
  9     ." Time stopped:  " 2SWAP .SHOWTIME CR
 10     ." Elapsed time:  " 2SWAP .ELAPSED  CR CR ;
 11 : BENCHMARK CLEARSCREEN ." BENCH v1.00 24-Mar-82" CR CR
 12     NRITERATIONS @ . ." iterations in loop." CR CR
 13     ." 16-bit Integer test" @TIME INTEGERS-16 @TIME .REPORT
 14     ." 32-bit Integer test" @TIME INTEGERS-32 @TIME .REPORT
 15     ;
```

OLYMPIA®

Introducing The Olympia ESW 102

Traditional Olympia quality and reliability

Single unit retail list price equal to most competitors volume discount price

Over 200,000 units installed worldwide

Supported by over 1,000 Olympia dealer service organizations nationwide

Superb print quality with Whisperdisc® print wheel

Most popular type styles available

Four pitches including proportional spacing

Choice of ribbon systems

Automatic bi-directional printing

Plug compatible interfaces

Print enhancements such as bold print and expand print

Choice of paper handling options

Introducing The Olympia ESW 103

Also available as an input/output typewriter terminal

Discover a new concept in letter-quality printers today

Contact Eugen P. Koch, National Sales Manager—OEM Products

A bright new opportunity in letter-quality printers

Your key to the electronic office

OLYMPIA USA INC
BOX 22
SOMERVILLE, NJ 08876
(201) 722-7000

CIRCLE 197 ON READER SERVICE CARD

Firms Mentioned in this Column

Argus, Inc.
P.O. Box 9777
Baltimore, MD 21204

SemiDisk Systems
P.O. Box GG
Beaverton, OR 97075
(503) 642-3100

IBM
Advanced Manufacturing Systems
1000 N.W. 51st St.
Boca Raton, FL 33432
(800) 327-0166; in Florida (800) 432-0188

Metamorphic Systems, Inc.
P.O. Box 1541
Boulder, CO 80306
(303) 499-6502

Davong Systems, Inc.
1061 Terra Bella Ave.
Mountain View, CA 94043
(415) 965-7130

Quantum Software Systems Ltd.
7219 Shea Ct.
San Jose, CA 95139

CompuCover
P.O. Box 324
Mary Esther, FL 32569
(904) 243-5793

Cover Craft, Inc.
Amherst, NH 03031
(603) 889-6811

IBM
External Submissions Department
Armonk, NY 10504

PC Magazine
1239 21st Ave.
San Francisco, CA 94122
(415) 753-8088

Personal Computer Age
CRC Publishing
10057 Commerce Ave.
Tujunga, CA 91042
(213) 352-7811

Que Corporation
6515 E. 82nd St., Suite 110
Indianapolis, IN 46250
(317) 842-7162

Laboratory Microsystems
4147 Bethoven St.
Los Angeles, CA 90066
(213) 390-9292

Systemics
3050 Spring St.
West Bloomfield, MI 48033
(313) 851-2504

IBM, continued...

I was looking for my IBM macro-assembler, but it's finally here. I got the call from the IBM product center at 5:30 on a Friday afternoon, so I couldn't rush down to get it and I didn't get to try it out in time for this column. You'll hear more.

For now, I'll quietly complain that the product was announced in December for February delivery, and that mine got into town on March 26. I had it on order for about 60 days. There is a problem lurking here somewhere. I found out that some of IBM's direct customers, that is, Data Processing Division customers, had their macro-assemblers in February.

Software Mini-Reviews

Systemics offers *EZLabel,* a $39.95 mailing label and phone list program. Bill Clements of Systemics writes that the program is not intended to be the most powerful or the fastest. Instead, it is supposed to be easy to use. I fooled around with it for a little while and I think it is pretty easy to use. I didn't read the directions (on purpose), but I had no difficulty. I don't know how well the program runs with a larger file, or if that even makes any difference for things other than searches and sorts.

The program allows up to 1000 name and address records per diskette. The only bad thing I noticed is that there seems to be quite a bit of disk activity while the program is running, more than I would have thought necessary. I think the package is reasonable, and priced well.

The biggest package I received this month, measured by weight, came from The Basic Business Software Company, Inc. I have six offerings from them, but I have only been able to try four. The *Statistics* package, which I was anxious to try, came with an unreadable diskette. I'm sure Basic Business will replace it; I just haven't been able to get it off to them.

Plot, their general purpose plotting package, requires a fair amount of data entry and setup before anything can be done, and I didn't have the time.

There are two financial packages, both of which sell for $30. The first is called *Financial Calculator* and performs a variety of calculations on present and future values. The document says the program closely matches the features of some of the popular hand-held financial calculators.

The second program is *Amortization and Depreciation,* which should be self-explanatory. Both these programs run smoothly and seem useful to me. In particular, I thought the *Financial Calculator* worked very well and was easy to use and understand.

I see little practical use for Basic Business's *Some Common Basic Programs.* This is a two-disk set for $35 which contains 76 Basic programs as published in the Osborne/McGraw-Hill book of the same name. The programs are very simple and all work according to the specifications from the book. However, most of these programs are small and should be easy to program.

I think you have to be able to use five or more of the programs, before the price of the package is worth the time you will save in program entry. Documentation for this package consists of brief instructions from Basic Business plus the Osborne/McGraw-Hill book.

I mentioned last month that I was anxious to try the Basic cross reference program from Basic Business's *IBM Basic Utilities* package. A cross reference program reads a Basic program and prints a listing of each name, identifying the line in which each "reference" occurs.

This particular program works well and produces a nicely formatted listing. It cross references variables, constants, line

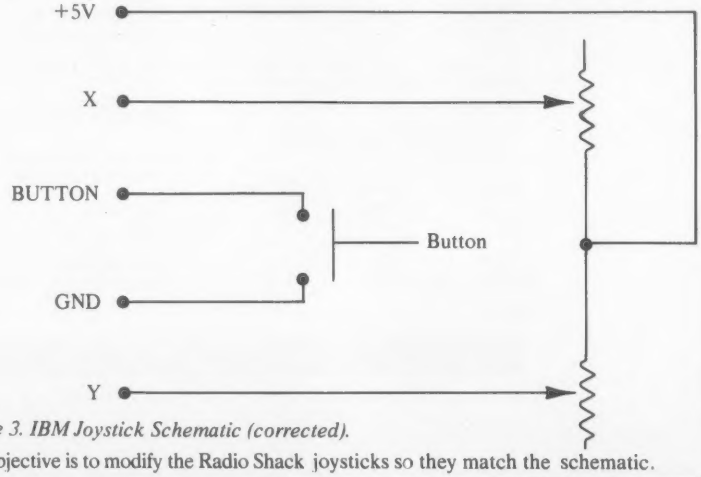


Figure 3. IBM Joystick Schematic (corrected).

The objective is to modify the Radio Shack joysticks so they match the schematic.

numbers, and (optionally) the Basic reserved words, that is, words like PRINT, FOR, etc. The listing is printed alphabetically.

The main problem with this program is that it is written in Basic, and is very slow. A nice touch, designed to let you know that the program is running, is the way the program constantly updates the display.

The Utilities package also includes a number of other useful programs and subroutines. There is a program to print paginated listings of text files. There are some subroutines for taking input and for dealing with the display, some matrix routines, a file search routine, and even a tiny screen editor (which edits a single screenful only).

My favorite, however, is the line drawing routine. This program, like the other subroutines, is designed to be integrated into your program. It is used to draw boxes or lines, and can be used to construct rather nice looking screen layouts for forms or other displays.

I think $75 is not unreasonable for the utilities, but I wish the cross reference program ran a little faster for that price, since it is the most useful program in the package.

All the Basic Business packages have one thing in common: they are very well documented. In the *Financial Calculator*, for example, all the formulas used in the program are explained in detail. Many examples are given, along with pictures depicting the way the display will look at various stages of program operation. The programs were not originally written for the IBM, so they have some maturity and can be expected to be free of bugs.

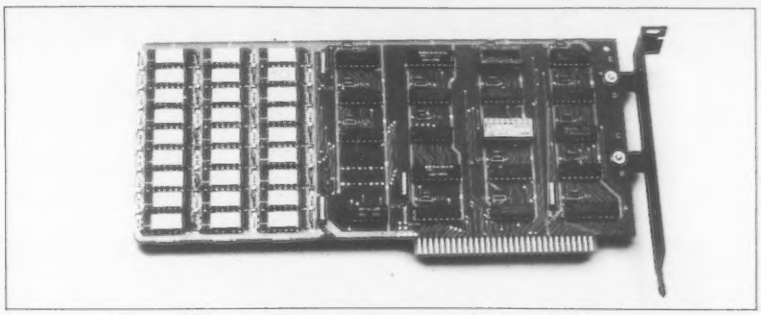


Photo 4. Davong Systems' 192Kb memory expansion board.

My Face is Red Department

The schematic for the Radio Shack joystick from my April column is incorrect. The correct drawing is shown in Figure 3. I apologize for this trivial mistake. Thanks to Frank Buswell of Essex Junction, VT, for calling this to my attention.

This one was not my fault, but my face is red anyway. Last month I reported on add-in memory boards for the IBM PC. When I got to Davong Systems I mentioned prices and had photographs. All were wrong. While most of the manufacturers are building a 256K board that can be populated in multiples of 64K, Davong is building boards with exact capacities. Assuming they can get the necessary volume, this helps keep the price down, and Davong has some low (they say the lowest) prices. The DSI-64K is $299, the DSI-192K is $599, and the DSI-256K is $799. For you Apple owners, Davong has the DSI-A16K expansion board for $99. The 192K board is shown in Photo 4. □

Introducing the SERIES 900 **MARKET MAVERICK**

A new stock market program from FSI for the serious investor

Used with the Apple II,* the Series 900 "Market Maverick" provides immediate investment counsel and is not just another device that raises more questions than it answers. Utilizing shorter forecast time horizons, Series 900 has a long history of excellent performance even under extreme market conditions. With fewer inputs, it is user friendly—yet it answers questions asked from many angles and points of view. Series 900 "Market Maverick" is not a game. It is not theoretical. It is for the serious investor or stock broker. Send for yours today. ***Requires 48K Apple II/II Plus, DOS 3.3 and Applesoft in ROM or 16K RAM expansion.***

Save $30...Limited Time Offer. If you order now, we will ship your Series 900 "Market Maverick" for just $145.00—and that's $30.00 off the regular price! MasterCard/ Visa welcome, as are dealer inquiries.

*Apple II is a registered trademark of Apple Computer, Inc.

* Over 10 years of excellent performance
* Stock data provided for immediate use on over 900 stocks
* Logic is based on precisely-read variables
* Fantastic results in up or down markets

SAVE $30 **FREE BROCHURE**

☐ Please send me the Series 900 Market Maverick for just $145.00. (Ohio residents add 5% sales tax)

☐ Please send me the free brochure which contains additional specific information on the "Market Maverick."

Paid by: ☐ Check to Financial Software, Inc.
☐ MasterCard ☐ Visa

Card #_____ Exp._____

Name _____

Address _____

City _____ State_____ Zip_____

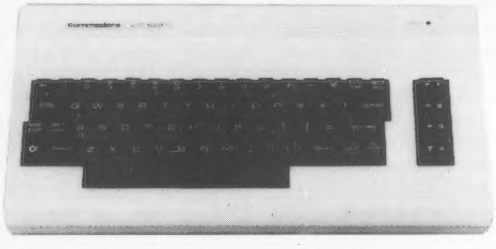
FINANCIAL SOFTWARE, INC.

11401 Westridge Circle, Chardon, OH 44024 / (216) 338-6811

INTRODUCTORY **PRICE** **$145.00** **SAVE $30**

CIRCLE 158 ON READER SERVICE CARD

Personal Electronic Transactions



I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

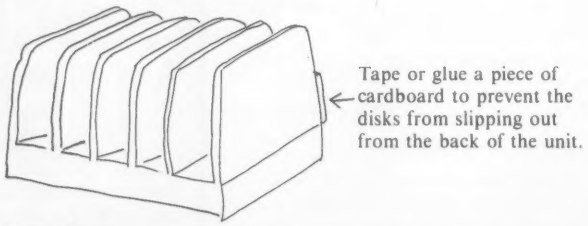
Greg Yob

When I first got my PET, I thought that a few dozen cassettes would be sufficient for my computing needs. Then it was 50 cassettes, then about 100 cassettes. When I got my disk drives, I knew better, and started with 50 diskettes. At this time, my collection is about 100 diskettes.

Naturally, I had a problem storing all these things. Fortunately, several manufacturers now provide binders for cassettes, plastic pouches and binder inserts for diskettes and so on. If you visit any major stationery store and look in the "word processing" department you can usually find a variety of holders for diskettes (and sometimes tapes). A not very representative sampling of these have crossed my desk recently, and several are described below.

First, if your funds are limited, go to Woolworth's or Radio Shack and buy their cassette holding boxes for about $2.75. These will hold 12 or 15 tape cassettes. For diskettes, purchase a letter-filer (This widget looks like a base with several vanes about 5" square projecting upward) for about $6 and tape a piece of cardboard to the back as shown in Figure 1. This is a handy way of holding your often-used diskettes. One disadvantage is that your diskettes are not protected from dust and grime.

Figure 1. Cheapskate Disk Filer.

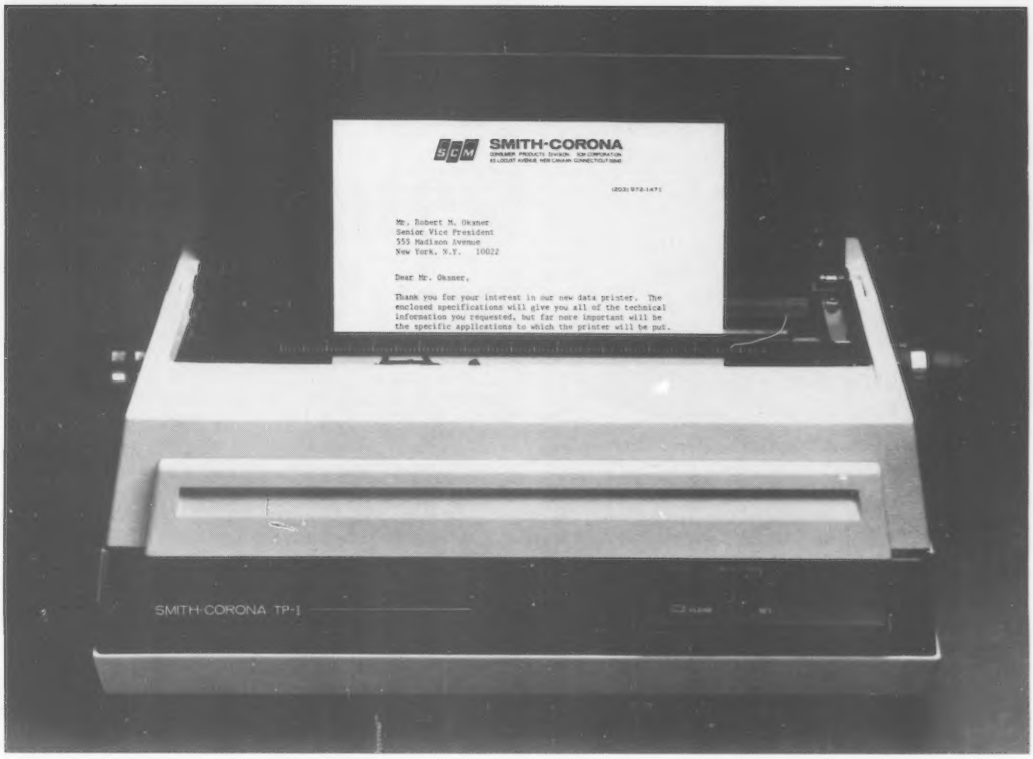

Tape or glue a piece of cardboard to prevent the disks from slipping out from the back of the unit.
Plastic letter sorting unit

For cassette storage, plastic binders with pop-in slots for the tapes are available from: Ettessac, Inc., 23704 West Sards Road, Valencia, CA 91355 and Reliance Plastics, 225 Belleville Ave., Bloomfield, New Jersey 07003. Write a letter requesting their catalogs and the name of a local dealer. Both companies prefer to work with dealers and do custom packaging if you need it.

Reliance also offers a wide variety of binders and pocketed plastic binder pages for holding diskettes. I am personally a bit concerned about the tendency of plastic to gather dust, but many of my friends use these without any problems. For more rapid access to diskettes, Skyles Electric Works, 231 E. South Whisman Road, Mountain View, CA 94041, offers Flip Sort, a plastic flip-top box which holds 60 diskettes for about $30. (Skyles has several other neat things for the PET, so ask for their catalog. They also offer Floppy-Armour, which is my personal choice for mailing diskettes.)

If you have a business or an office, and can afford more costly things, Postal Equipment Corp., 752 Military Rd., Buffalo, NY 14216 offers the MM-1 which is a steel diskette tray about 8" deep with steel and cardboard dividers and a vinyl

Smith-Corona introduces the only daisy wheel printer for under $900.*


SMITH-CORONA
Mr. Robert M. Oksner
Senior Vice President
555 Madison Avenue
New York, N.Y. 10022
Dear Mr. Oksner,
Thank you for your interest in our new data printer. The enclosed specifications will give you all of the technical information you requested, but far more important will be the specific applications to which the printer will be put.
SMITH-CORONA TP-1

You're putting together a desktop computer system for your office or home. And you want to add a letter quality printer so you can do word processing, too. But you don't want to spend a fortune.

Until now, you really had little choice but to settle for dot matrix printers. True, dot matrix doesn't produce letter-perfect printing, but daisy wheel printers just cost too much. That is, they did.

Now, Smith-Corona® offers a daisy wheel printer at such an incredibly low price, you can't afford *not* to get it. (The fact is, you won't find a daisy wheel printer *anywhere* at a price so low.)

The Smith-Corona TP-I™ printer operates with microprocessor controlled daisy wheel technology, and is available with either standard serial or parallel data interface. It is compatible with most microcomputers currently on the market. And, unlike many printers, it's made in America.

Best of all, the TP-I produces results identical to those of our very finest office typewriters—printing with real character. So it can be used to send out letters that have to look perfect. As well as financial statements, inventory reports, direct mail campaigns, manuscripts. Even a letter to your son in college! Anything at all you need printed.

The basic TP-I will handle letter or legal sized paper. An option that will be available soon will enable it to handle either fanfold or single sheet paper.

The TP-I is easy-to-use—just turn the power on, load the paper, and away it goes. There are drop-in ribbon cassettes and a choice of easy-to-change, snap-on daisy print wheels for a variety of fonts.

So stop thinking you can't afford a daisy wheel printer. Because, thanks to Smith-Corona, a printer with real character is no longer expensive. **Smith-Corona**

Please send me more information on the Smith-Corona TP-I daisy wheel printer.

Name_____

Title_____

Company Name_____

Business Address_____

City_____ State_____ Zip_____

Mail Coupon to:
Dwight P. Newcomer, National Sales Manager—Office Products
Smith-Corona
65 Locust Avenue
New Canaan, Connecticut 06840 CC-7

*Manufacturer's suggested retail is under $900, but prices may vary.

CIRCLE 238 ON READER SERVICE CARD

dust cover. This unit is well-built; I could drop it down a flight of stairs with no worries. This company only sells through dealers, so ask them for a local distributor's name. The MM-1 is about $75.

At the top of the heap is the Disk Bank by Amary, 2251 Grant Rd., Suite H, Los Altos, CA 94022. This is a plastic, box-like unit which has a sliding drawer which pulls out and turns to the side for each access to the diskettes. Each box holds 10 or 12 diskettes. The boxes lock together to make a filing unit of any size you want. The sliding part can be positioned to make the slide come out upwards instead of to the side for tub files. Though this unit is excellent, the price is a bit high — about $11 per unit. Amary will be offering this unit through diskette suppliers and the additional cost should be less (that is, you buy 10 diskettes and one Amary unit for $5 to $8 over the diskette price).

"Uncopyable" Tapes

The PET is a very difficult machine for which to provide software protection, and the only effective methods I know involve some hardware, usually a ROM whose firmware is used by programs on tape or disk. Some software suppliers protect their programs by placing machine language in the cassette buffer. When you SAVE such a program, the SAVEd copy will not work when reloaded, because the cassette buffer portion is not on the SAVEd copy. The cure is to use the Machine Language Monitor to help out a bit. Reset the PET and LOAD (but don't RUN) the program. Then SYS 1024 to get into the Monitor. You will now see something like this:

```
SYS 1024
B*
     PC  IRQ  SR  AC  XR  YR  SP
.;  0401 E62E 32  04  5E  00  F8
```

Now enter the following line starting with the S (the Monitor prints the period):

```
.S "0:FILENAME",08,0200,8000
(RETURN)
```

This will save the program to your disk, drive number 0. If you know the size of the program, the 8000 may be replaced by a smaller value. For example, 16K programs would use 4000 and 8K programs use 2000. If you have problems with this, note that the Monitor does not like spaces after the filename and the commas must be present. Also note that the first letter in your line is the period printed by the Monitor.

If you want to save to tape, use:

```
.S "FILENAME",01,0200,8000
```

By the way, don't use this method to make copies for your friends. The current copyright law lets you make a copy for archival and backup uses only. (Note to Educators: Many schools with several PETs buy one copy of a software package and then make copies for the other machines. This is unfair (and illegal) to the software vendors. I know of several *excellent* programs that were never marketed due to this problem.)

A Reasonable GET Routine

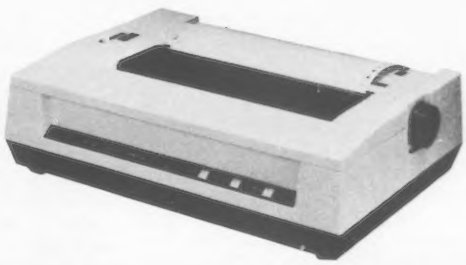
If you have used your PET for very long you have noticed that the Basic INPUT statement is not without flaws. If you press the Return key without anything else, the Basic program simply quits. (Use CONT to resume your program.) Also, quotation marks, commas, colons and semicolons do strange and non-beneficial things when entered in response to INPUT. If you want your program to be crash proof, you must

Listing 1. Utility Get Routines.

```
10000  REM GENERAL GET ROUTINE WITH
10005  REM FALSE CURSOR
10010  REM RECOGNIZES ONLY THE DEL KEY
10015  REM WHEN GETTING A STRING
10020  REM
10025  REM CURSOR DEFINITIONS
10030  REM C1$,C2$ = BLINKING CURSOR
10035  REM C1,C2 = TIMING OF BLINK
10040  REM CW = FIELD WIDTH
10045  C1$="{RVS}{V}{Off}{CL}":C2$="{0}{CL}":C3$=" {CL}"
10050  C4$=CHR$(1)
10055  C1=75:C2=50:CW=72
10060  REM FOR NUMBERS
10065  DIM N(20)
10070  RETURN
10100  REM ACTUAL CODE
10105  REM MAIN GET LOOP
10110  PRINT C1$;
10115  GETA$:IFA$>""THENRETURN
10120  FORJ=1TOC1:NEXT
10125  PRINT C2$;
10130  GETA$:IFA$>""THENRETURN
10135  FORJ=1TOC2:NEXT
10140  GOTO 10110
10200  REM SELECTION & ECHOING
10205  A=ASC(A$):AF=0
10210  IF A$=CHR$(13) THEN 10255
10215  IF A=20 THEN 10265
10220  IF A<32 THEN PRINTC3$;:RETURN
10225  IF A=34 THEN PRINTCHR$(34)CHR$(20);
10230  IF A>95 THEN PRINTC3$;:RETURN
10235  IF LEN(B$)=CW THENPRINTC3$;:RETURN
10240  B$=B$+A$
10245  A=FRE(A):PRINTA$;:RETURN
10250  REM CARRIAGE-RETURN
10255  PRINTC3$:AF=1:RETURN
10260  REM DELETE
10265  IFB$=""THENRETURN
10270  IF LEN(B$)>1 THEN 10280
10275  B$="":GOTO10245
10280  B$=LEFT$(B$,LEN(B$)-1)
10285  GOTO 10245
10300  REM INPUT A STRING B$
10305  B$=""
10310  GOSUB10100:GOSUB10200
10315  IF AF THEN RETURN
10320  GOTO 10310
10400  REM GET A NUMBER OR SERIES THEROF
10405  REM N(0) HOLDS NUMBER OF #S FOUND
10410  REM SCIENTIFIC FORM IGNORED
10415  N(0)=0:K=1:B$=""
10420  REM GET B$ ONLY NUMERICS OK
10425  GOSUB10100
10430  IF A$>"9"THENA$=C4$
10435  IF A$<"0"THEN 10455
10440  GOSUB10200
10445  IF AF THEN 10490
10450  GOTO 10425
10455  IF A$="."THEN10440
10460  IF A$="-"THEN10440
10465  IF A$=","THEN10440
10470  IF A$="+"THEN10440
10475  IF A$<" "THEN10440
10480  GOTO10425
10485  REM NOW PARSE B$
10490  N$="":IFB$=""THEN RETURN
10495  FORJ=1TOLEN(B$)
10500  IF MID$(B$,J,1)=","THEN 10510
10505  NEXT
10510  N$=LEFT$(B$,J)
10515  B$=MID$(B$,J+1)
10520  N(K)=VAL(N$):N(0)=K:K=K+1
10525  IF K>20 THEN RETURN
10530  GOTO 10490
```

C. ITOH & ASAP
The Greatest Deal in Print

ASAP brings you the C.Itoh Pro/Writers and F-10 Printmaster. C.Itoh now gives you the latest performance and operator-oriented features as standard. With the quality and durability you've come to expect from C.Itoh printers. And now, you get all this at ASAP's low, low price. Compare the features. Then call ASAP to make your deal on a C.Itoh printer.



Pro/Writer and Pro/Writer II Low Profile Printers

These low profile printers provide professional, quality printing through a combination of high-speed matrix printing, logic seeking uni- and bidirectional printing, and quick return head motion. The Pro/Writer II accommodates paper widths up to 15½", with up to 231 columns. The precision 9 x N matrix produces consistent, letter-quality printing. Five alphabets, in eight character sizes, provide added versatility. What's more, Pro/Writer and Pro/Writer II feature proportional spacing combined with excellent character resolution. Built-in graphics capability includes character generated and high resolution features.

Specifications	Pro/Writer 8510ADC	Pro/Writer 8510AP	Pro/Writer II
Number of columns	80 column max.	80 column max.	136 std., 231 compressed
Print speed	120 cps	120 cps	120 cps
Print width	8" max.	8" max.	13.6" max.
Standard interfaces			
Serial	EIA RS-232-C with 3K buffer & 20 mA current loop	—	EIA RS-232-C with 3K buffer & 20 mA current loop
Parallel	TTL compatible, 7-bit	TTL compatible, 7-bit	TTL compatible, 7-bit
High resolution graphics 144 x 160 positions per inch	Standard	Standard	Standard

F-10 Printmaster Daisy Wheel Printer

This high quality printer features a choice of 40 and 55 cps. Extensive word-processing functions have been built in to allow easy adaptability and reduced software complexity. Choice of friction feed or bidirectional tractor feed enables precise print positioning of tabular and graphics data.

Specifications:

Number of printable columns: 136, 163 variable
Return time: 900 mSec @ 40 cps; 500 mSec @ 55 cps
Line feed time: 40 mSec
Interface: 8-bit parallel, RS-232-C compatible, X-ON, X-OFF, 12-bit Qume and Diablo compatible
Model #: F10-40PU (Parallel interface)
Model #: F10-40RU (Serial interface)

asap computer products, inc.
1198 E. Willow St., Signal Hill, CA 90806

Toll free outside California:
(800) 421-7701
Inside California:
(213) 595-6431
(714) 891-2663

ASAP offers a 15-day buyer protection policy; full money back guarantee if not totally satisfied.

Ordering information: Name, address, phone; ship by UPS or truck. Please call for shipping charges.

Terms: We accept cash, check, money orders, Visa and Master Charge (US funds only) Tax 6% Calif. res. COD's and terms available on approval (school PO's accepted).

CIRCLE 108 ON READER SERVICE CARD

disable the STOP key and use GET for all inputs.

Listing 1 shows a GET routine which I have found quite useful for most of my general programming in Basic. Several subroutines are provided:

- 10000 initializes variables for the other routines.
- 10100 displays a false cursor until a key is pressed.
- 10200 handles quotes, delete key, carriage-return and echoing.
- 10300 returns B$ as a line of input.
- 10400 returns numbers in array N().

A closer look at these routines may be of interest. Subroutine 10000 defines the strings C1$ and C2$ which hold the characters used as a false cursor. C1$ is set to Reverse Shift-V Off Cursor-Left. C2$ is set to Shift-Q Cursor-Left. C3$ is a space and cursor left and is used to erase any false cursor on the screen when a keypress is detected.

The numbers C1 and C2 are used to determine the blinking rate of the cursor. CW is used as the maximum number of characters that can be entered. If the user enters more than CW characters, subroutine 10300 will return automatically.

Subroutine 10100 is used to print a false cursor, check for a keypress, wait for a while and then repeat using the other false cursor characters. Lines 10100 through 10120 do this for the first cursor, C1$, and lines 10125 through 10135 do this for the second cursor, C2$.

Note that you can change the values of C1$, C1, C2$, C2 to suit yourself as to the cursor and how rapidly it blinks. Remember to include a Cursor-Left in the false cursor string to leave the cursor on top of the character you select for the cursor. Also, set C2 to less than C1 as it takes some time for Basic to execute the GOTO 10110 after the second cursor.

Subroutine 10200 is more complex. The string A$ holds the keypress from subroutine 10100 and we must now decide what to do about it. Line 10205 converts A$ to its ASCII value as A and the flag AF is set to false. AF is used in subroutines 10300 and 10400 to detect if the Return key was pressed.

Line 10210 checks for Return, and if found we go to 10255 which prints C3$. This erases the last false cursor which is still on the screen. AF is set to True and we are done.

Line 10215 checks for the DEL key which puts us into lines 10260 through 10285. B$ is used to store the characters already entered, and the code here is used to correct B$ for the deletion and prevent a crash due to an empty B$ string. When we are done with B$, line 10245 is used to print the deletion on the screen as DEL is still in A$.

Lines 10220 and 10230 check for other special characters like the cursor movements. In all such cases, we erase the false cursor and otherwise ignore special characters. The only way to correct an entry is via the DEL key. Line 10225 handles quotes, since to get into Quotes Mode would be a disaster. (Try moving this line and enter a quote, and you'll see what I mean.) The trick used here is to print a Quote, then a DEL and when we get to line 10245, the Quote again. Only *one* Quote is on the screen and we are *not* in Quotes Mode.

Line 10235 checks for the limiting line length CW. If too many keypresses have been made, the false cursor is "stuck" at the end of a line until you press Return.

Line 10240 adds the keypress to B$, and in line 10245 we echo the keypress to the screen. The call to FRE forces garbage collection. If you ignore this the PET will occasionally stop cold for up to a minute as garbage collection takes time, especially in Basic 3.0 machines.

With subroutine 10200 doing most of the work, subroutine 10300 clears B$ and repeatedly calls subroutines 10100 and 10200 until the flag AF notes that the Return key was pressed. For most purposes, when you want to replace an INPUT, use GOSUB 10300 and then look at the contents of B$. If B$ is empty, only Return was entered.

If you need some numbers, subroutine 10400 will permit entry of floating point numbers but not scientific numbers (scientific numbers have the E in them like 1.23 E22). If you need scientific numbers, add this line:

```
10472 IF A$="E" THEN 10440
```

Subroutine 10400 clears the array N() by setting N(0) to zero. N(0) is used to count the number of entries made in B$. It then calls subroutine 10100 to get the keystrokes and checks them for the characters which are legal in numbers (that is, 0-9, +, - and .).

Legal number characters then go into B$. When we see the Return key (line 10445) the code in lines 10490 to 10530 looks through B$ for commas. Each chunk of B$ between commas is moved to N$ and converted into the array N() in lines 10510 through 10520. Since we use the VAL function, this code will not see entries like ++25; you will get a zero back instead.

```
 10 REM GET ROUTINES EXAMPLE
 20 GOSUB 1000 :REM INITIALIZE
 30 PRINT "YOUR NAME: ";
 40 GOSUB 10300:NM$=B$: REM GET NAME
 50 IF B$=""THEN 30 :REM TRY AGAIN
 60 PRINT
 70 PRINT "ENTER THREE NUMBERS: ";
 80 GOSUB 10400 :REM GET NUMBERS
 90 IF N(0)=3 THEN 110 :REM CHECK FOR THREE
100 PRINT "I NEED THREE NUMBERS!":GOTO60
110 S=N(1)+N(2)+N(3)
120 PRINT
130 PRINT NM$","
140 PRINT "THE AVERAGE IS: ";S/3
150 END
```

Listing 2.

Listing 2 is a brief example of how the GET routines might be used.

Line 50 checks for a non-entered name and line 90 checks for the wrong number of numbers. Note that the array N() uses N(0) for the number of entries which are then stored in N(1), N(2) . . . and so on.

The Pedisk II

CGRS Microtech, P.O. Box 102, Langhorne, PA 19047, offers an alternative to the Commodore disks called the Pedisk II. The Pedisk offers more storage per diskette and much faster disk I/O since it does not use the IEEE 488 bus. Both 5¼" and 8" disk drives are available, with the 8" drive having the IBM standard format. (When CP/M arrives for the PET, I expect the Pedisk will be much simpler to interface than the Commodore drives.) Basic, Forth, MAE (Editor/Assembler) and several other utility programs are now available.

The Pedisk DOS offers several interesting options not found in Basic 4.0 or the Commodore disks. Many of the DOS commands look simpler to use than Commodore's. If you are looking for an alternative to the CBM Disks, take a look at CGRS Pedisk II. When you do so, note that I haven't personally tested their system and that you will have to find a friend with the CBM drives to transfer software. Many programs are very dependent on the CBM drives and you may have to spend some time making suitable modifications. I expect CGRS will form a user's group soon.

The User Port Workshop

Back in early 1979 I wrote an article which described how to use the PET User Port. To illustrate the operation of the User Port, I designed and built a small set of switches and LEDs which controlled each User Port line and indicated the level of the lines.

Interested in computers or robotics? Looking for info on hardware, software, theory, and applications?

The Computer Book Club offers you an incredible range of computer books *and* a huge variety of tapes and disks . . . *ALL at low, low member prices!*

Select 6 fact-filled books for only $2.95 (total value up to $111.70)

1187 List $15.95 — The FORTRAN Cookbook

119 PRACTICAL PROGRAMS FOR THE TRS-80 POCKET COMPUTER — 1350 List $15.95

1200 List $16.95 — HOW TO BUILD YOUR OWN WORKING MICROCOMPUTER

1228 List $12.95 — 34 MORE Tested, Ready-To-Run Game Programs in BASIC

1303 List $14.95 — HOW TO SOLVE STATISTICAL PROBLEMS WITH YOUR POCKET CALCULATOR

1299 List $16.95 — MASTER HANDBOOK OF MICROPROCESSOR CHIPS

1050 List $10.95 — THE MOST POPULAR SUBROUTINES IN BASIC

1341 List $18.95 — HOW TO DESIGN & BUILD YOUR OWN CUSTOM ROBOT

1398 List $14.95 — COBOL

1394 List $15.95 — PROGRAMMING YOUR APPLE II COMPUTER

1293 List $15.95 — 80 PRACTICAL TIME-SAVING PROGRAMS FOR THE TRS-80

1085 List $11.95 — 24 TESTED, READY-TO-RUN GAME PROGRAMS IN BASIC

1397 List $16.95 — WHAT TO DO WHEN YOU GET YOUR HANDS ON A MICROCOMPUTER

1183 List $14.95 — TROUBLESHOOTING MICROPROCESSORS & DIGITAL LOGIC

1111 List $15.95 — 55 ADVANCED COMPUTER PROGRAMS IN BASIC

1276 List $15.95 — HOW TO DESIGN, BUILD & PROGRAM YOUR OWN HOME COMPUTER SYSTEM

1295 List $16.95 — COMPUTER GRAPHICS with 29 ready-to-run programs

1053 List $13.95 — Microprocessor Cookbook

1369 List $21.95 — THE GIANT BOOK OF COMPUTER SOFTWARE

1333 List $16.95 — 101 MICROPROCESSOR SOFTWARE & HARDWARE PROJECTS

1055 List $8.95 — The BASIC Cookbook

1169 List $16.95 — The GIANT Handbook of Computer Projects

1391 List $17.95 — PROJECTS IN MACHINE INTELLIGENCE FOR YOUR HOME COMPUTER

1045 List $11.95 — Programmer's Guide to LISP

1330 List $15.95 — TEACHING YOUR COMPUTER TO TALK

1271 List $16.95 — Microcomputer Interfacing Handbook: A/D & D/A

1290 List $15.95 — IC TIMER HANDBOOK

1380 List $18.95 — 30 COMPUTER PROGRAMS FOR THE HOMEOWNER, IN BASIC

Join now and get *the Computerist's Handy Manual* . . . FREE! (List $3.50)

7 very good reasons to try The Computer Book Club

Blue Ridge Summit, PA 17214

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 13 times a year with dozens of up-to-the-minute titles you can pick from
- **"Automatic Order".** Do nothing, and the Main selection will be shipped automatically! But . . . if you want an Alternate—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling membership obligation, and qualify for discounts on many other volumes
- **Extra Bonuses.** Take advantage of added-value promotions, plus special discounts of software, games, and more
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with up-to-the-minute info

THE COMPUTER BOOK CLUB

Blue Ridge Summit, PA 17214

Please accept my membership in the Computer Book Club and send the 6 volumes circled below, plus a free copy of *Computerist's Handy Manual*. I understand the cost of the books selected is $2.95 (plus shipping /handling). If not satisfied, I may return the books within ten days without obligation and have my membership cancelled. I agree to purchase 4 or more books at reduced prices during the next 12 months and may resign any time thereafter.

1045 1050 1053 1055 1085 1111 1169 1183 1187
1200 1228 1271 1276 1290 1293 1295 1299 1303 1330
1333 1341 1350 1369 1380 1391 1394 1397 1398

Name _____ Phone _____

Address _____

City _____

State _____ Zip _____

(Valid for new members only. Foreign and Canada add 20%. Orders outside U.S. or Canada must be prepaid with international money orders in U.S. dollars.)

CC-782

CIRCLE 124 ON READER SERVICE CARD

Machsize Ltd., York House, Clarendon Ave., Leamington Spa, England, CV32 5PP, offers a User Port Workshop for about $95 (£59.95). The Workshop is a green PC card about 5″ by 9″ with an 18″ connecting cable which attaches to the User Port and the Cassette Port on the rear of the PET. The cable lets you use the Workshop in front of the PET.

On the PC card are ten switches with LEDs in them. Eight of these switches are for the PA0 to PA7 data lines and two switches connect to CA1 and CB2. The data switches are normally open, which lets the data lines float to the high state. Pressing a data switch grounds the line, making a low (0) state. The CA1 and CB2 switches are debounced (very handy!) and the CA1 switch has a jumper which lets you select the low to high or high to low transition when the switch is pressed.

The card has expansion edge pins for the User Port and Tape Port to let you debug any equipment on the User Port.

Twelve buffered screw connectors are also provided, including the +5V line from the Tape Port in case you want to build a kludge or use an oscilloscope.

Although I like the card, I have two small criticisms. First, sometimes I like to set a User Port line while doing something else. Slide or toggle switches would be better than momentary contact switches.

Second, if you set the User Port to output a line and set the line high, when you ground the line, the VIA suffers (and sometimes dies). Limiting resistors on the switches would remove this hazard.

A binder is provided with instructions and a demonstration diskette. The card has two holes so you can store the Workshop in its binder — a neat touch. The instructions are reasonably clear, with summaries of the required PEEKs and POKEs and some interesting exercises to do. The diskette has 11 programs which include four programs which are solutions to the suggested exercises. The demonstrations are nicely done, with Petophone providing a monophonic organ using CB2. (You will have to provide the speaker to hear this one.)

I feel the User Port Workshop is a nicely done product which would make an excellent addition to a high school electronics class. Machsize also offers several other cards including A/D and D/A converters, BCD input card and an optoisolated 8-line I/O card capable of driving relays and small lamps.

An Eclectic ROM — Faster Basic

If you are a hacker who studies how Basic works to make your programs run more rapidly, you know that in a few cases PET Basic isn't all that smart.

For example, a GOTO 1234 stores the number 1234 as the digits and not as a 16-bit binary number. At the same time, the line numbers themselves are in 16-bit form, so when Basic does the GOTO it must first convert 1234 to 16-bit form and then look for the line.

If Basic had stored 1234 in 16-bit form when the line was entered, the conversion time would be saved. The true fanatic can go further and store a direct pointer to line 1234 and also save the searching time.

In long programs, a small jump to a preceding line, say in a subroutine, involves a search through almost all of the program lines, which can slow things down a great deal. Similar arguments apply to simple variables. If we scanned through the program and set up the variables table first, the simple variables could be replaced by pointers and the search time eliminated.

Faster Basic is a 2K ROM which speeds up the jumping and variable search times by methods similar to those suggested above. Developed in England, it is available from Skyles Electric Works whose address was given earlier. In tests of very small programs, the GOTO and THEN and GOSUB statements executed about twice as rapidly, and numeric and string variables gained about 30% in speed. In larger programs the gains will be much greater — perhaps as much as twice as fast overall.

There are two catches to this. First, the FOR-NEXT loops in Basic already use pointers and will not run any faster. Second, arrays are not handled in Faster Basic. (When you think about it, there is really no way to do so — most arrays use variables in their indices like A(K).) If you are doing scientific number-crunching, you will probably use arrays and Faster Basic can't help you.

Hope is in the offing, however. Several compilers for Basic exist, and I will review these as they arrive.

And A Fun ROM — The PIC Chip

Another neat goodie from England is the PIC Chip (available from Skyles Electric Works for $60). The PIC Chip is a 2K ROM which has about 40 commands for control and modification of the PET display. This includes direct positioning of the cursor, screen fill, reverse, flip for normal/reverse field and set or flip case (i.e., upper to lower or vice versa) for the screen. Distinct areas of the screen may also be chosen for these operations.

The entire screen or a selected rectangular area can be shifted in all four directions or rolled (i.e., what goes off one edge returns on the other side). A complete set of plotting commands for 25x40 and 50x80 graphics is included along with the commands for "fine plotting" which lets you do up to 200 positions in Y or 320 in X. As a final touch, you can turn a repeat key option on or off which is helpful in editing. The PIC Chip is available for all addresses from $9000 to $B800 at 2K intervals.

The use of PIC Chip commands involves several reserved variables in Basic, specifically C, X, Y, X1, Y1, X2, Y2, A1, A2 and N. You must first set these variables to the correct values and then execute the PIC Chip command. For example, if you want to plot a character "A" at the co-ordinates 12, 15, you must do:

```
C=1:X=12:Y=15:!PC
```

I find this a bit awkward as !PC 1, 12, 15 seems more elegant (and, for an expert hacker, not that hard to do). One other drawback is that you must keep separate copies of these variables if you are doing many different PIC Chip commands. When you roll the screen, for example, the previous values for X1, Y1, X2 and Y2 are wiped out when you set them up for the screen roll.

When you are used to these oddities, the PIC Chip is a lot of fun. The manual gives a series of examples to help you get started. As a mystery I am leaving you with Listing 3, which is a short and mysterious program that requires the PIC Chip to run, and even with the PIC Chip I am sure you won't know what it does until you run the program. By the way, the bracketed parts of line 60 mean Home-Cursor, Cursor-Down and two Cursor-lefts. □

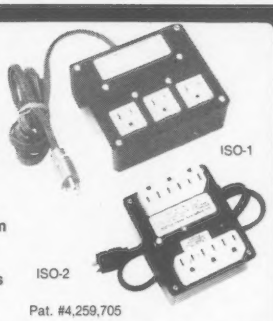
Listing 3. Mystery PIC Chip Program.

```
10  REM PIC CHIP DEMO
20  REM AND MYSTERY PROGRAM
30  REM BY GREGORY YOB
40  SYS 40960:!RE
50  C=32:!SF:N=1
60  PRINT"{Home}";:FORJ=1TO15:PRINT"PUNK{CD}{2 CL}";:NEXT
70  X=79:FORJ=9TO77:Y=J*J/55:!WX:Y=Y+4
80  !EX:NEXT
90  Y=49:FORJ=3TO80:X=J*J/39:!WY:X=X+X
100 !EY:NEXT
110 FORJ=1TO5000STEP5
120 X2=X2+J*1.21:X1=X1+J:Y1=Y1+J*1.12:Y2=Y1+J*1.27:!EX:!EY
130 IFX1>79THENX1=X1/1.55
140 IFX2>79THENX2=X2/1.77
150 IFY1>39THENY1=Y1/1.33
160 IFY2>39THENY2=Y2/1.23
170 !AI:!EC:!UR:!LR:NEXT
```

Note: Change the SYS address in line 40 to the SYS you use for your PIC Chip.

WARNING!

Electric Power Pollution. Spikes & Lightning HAZARDOUS to MICROCOMPUTERS!!



Patented ISOLATORS provide protection from . . .

- Computer errors cause by power line interference
- Computer errors due to system equipment interaction
- Spike damage caused by copier/elevator/air conditioners
- Lightning caused damage

MONEY BACK GUARANTEE!

- ISOLATOR (ISO-1) 3 isolated 3-prong sockets; Spike Suppression; useful for small offices, laboratories, classrooms. $69.95
- ISOLATOR (ISO-2) 2 isolated 3-prong socket banks; (6 sockets total); Spike Suppression; useful for multiple equipment installations. $69.95
- SUPER ISOLATOR (ISO-3) similar to ISO-1 except double isolation & oversize Spike Suppression; widely used for severe electrical noise situations such as factories or large offices. $104.95
- SUPER ISOLATOR (ISO-11) similar to ISO-2 except double isolated socket banks & Oversize Spike Suppression; for the larger system in severe situations. $104.95
- MAGNUM ISOLATOR (ISO-17) 4 Quad Isolated Sockets; Multiple Spike Suppressors; For ULTRA-SENSITIVE Systems in extremely Harsh environments. $181.95
- CIRCUIT BREAKER, any model (Add-CB) . . . . . Add $9.00
- REMOTE SWITCH, any model (Add-RS) . . . . . Add $16.00

AT YOUR DEALERS MasterCard, Visa, American Express

ORDER TOLL FREE 1-800-225-4876 (except AK, HI, PR & Canada)

ESP Electronic Specialists, Inc.

171 South Main Street, Box 389, Natick Mass 01760

(617) 655 1532

CIRCLE 156 ON READER SERVICE CARD

ATARI®

VIC-20 $249

800	(16K)	**649**
400	(16 K)	319
410	Recorder	74
810	Disk Drive	439
822	Printer (THERMAL)	269
825	Printer (80 COLUMN)	589
830	Modem	149
850	Interface	164
853	Memory (16K)	79

ATARI SOFTWARE

4002	BASIC CARTRIDGE	45	483	THE PROGRAMMER	52
4003	ASSEMBLER EDIT	45	484	THE COMMUNICATOR	299
4006	SUPER BREAKOUT	33	404	WORD PROCESSOR	110
4007	MUSIC COMPOSER	45	405	PILOT (EDUC)	99
4008	SPACE INVADERS	33	4106	PROGRAMMING 2	21
4009	COMPUTER CHESS	33	4117	PROGRAMMING 3	21
4011	STAR RAIDERS	37	8126	MICROSOFT BASIC	66
4012	MISSILE COMMAND	33	8121	MACRO ASSEM&EDIT	66
4013	ASTEROIDS	33	813	CAVERNS OF MARS	29

CALL OR WRITE FOR FREE CATALOG

COSMIC COMPUTERS UNLIMITED

228 N. PROSPECTORS RD.
DIAMOND BAR, CA. 91765

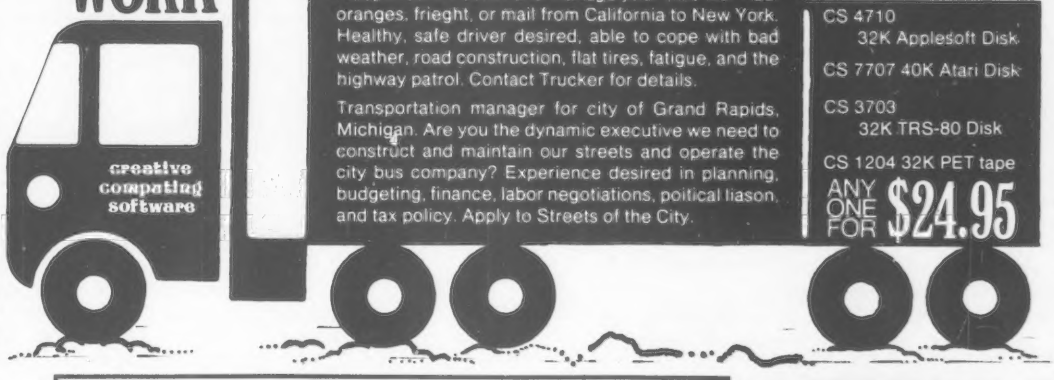
SHIPPING EXTRA $2 MINIMUM
PRICES SUBJECT TO CHANGE
CALIF. RESIDENTS ADD TAX

OPEN 7 DAYS 8am - 9pm **(714) 861-1265**

CIRCLE 142 ON READER SERVICE CARD

ROAD WORK

Help Wanted Be an indendent trucker or manage a city transportation department with these two award winning simulations!



Driver Wanted: Tired of being told what to do? Be an independent trucker and manage your own life! Haul oranges, frieght, or mail from California to New York. Healthy, safe driver desired, able to cope with bad weather, road construction, flat tires, fatigue, and the highway patrol. Contact Trucker for details.

Transportation manager for city of Grand Rapids, Michigan. Are you the dynamic executive we need to construct and maintain our streets and operate the city bus company? Experience desired in planning, budgeting, finance, labor negotiations, poitical liason, and tax policy. Apply to Streets of the City.

TRUCKER AND STREETS OF THE CITY

CS 4710
32K Applesoft Disk

CS 7707 40K Atari Disk

CS 3703
32K TRS-80 Disk

CS 1204 32K PET tape

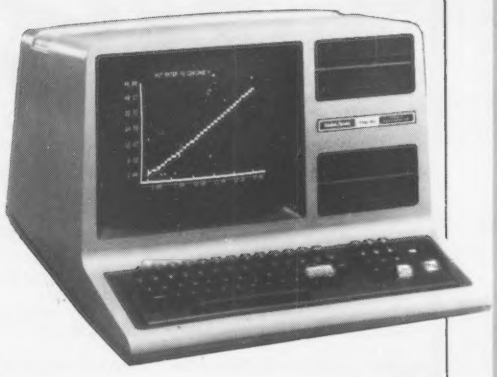
ANY ONE FOR **$24.95**

Order Today

To order send payment* plus $2.00 postage and handling to Creative Computing, Dept. C721, 39 E. Hanover Avenue, Morris Plains, N.J. 07950. Orders may also be charged to your Visa, Mastercard or American Express account—by mail include credit card name, number and expiration date, or if you prefer, use our toll-free number, 800-631-8112. In N.J. only 201-540-0445.

*N.J. Residents add 5% tax.

creative computing software



rings...trs-80 strings...trs-8

Stephen B. Gray

Diving with a roar into the 42-mile tunnel that burrows beneath the glitter and swank of Park Avenue, our TRS-80 train brings you the details of how Radio Shack checks out your disk drives, three programs from Instant Software, a closer look at those ads offering lower-priced TRS-80s, Sharp's pocket-computer manuals, and a short screen-saver program.

Disk-Drive Repair

Late last year, drive 1 on my TRS-80 Model III began to act up, giving GAT, CRC and HIT error messages. Eventually it just wouldn't work at all. I tried to use it now and then, hoping that, like a toothache, the problem would go away.

When the problem persisted, I put the III back into its box and took it to the service department of the Radio Shack Computer Center at Fifth Ave. and 36th St. in New York. With the very kind permission of a Radio Shack vice president and of the center's service manager, Patrick Raeihle, I was allowed to watch computer technician Michael Simmons tackle the drive.

Mike told me that ordinarily he can align a pair of disk drives in about 20 minutes, once a Model III is unbuttoned. However, with all my questions and his very patient answers, it took several times that long.

Mike removed one screw from the back and ten from the bottom of the Model III. A warranty sticker covers one of those ten. Once you remove this sticker to do your own thing inside a Model III, you'll find you can't put it back on, and you've probably voided the remaining warranty.

What happens if you have installed a "foreign" modification in your Model III (or any other Radio Shack) computer? According to Pat, you have to take out the modification before Radio Shack will repair it. If you don't take it out before bringing your machine to be repaired, they'll do it for you, if they find they can't work around the modification, but will charge you for the removal, and won't re-install the modification. This is the official Radio Shack service policy, as stated in the back pages of the Model III manual, among other places.

After lifting off the top of the Model III, Mike tried a backup, "to verify the complaint." Although drive 1 wrote the backup, and a DIR could be read, the drive slowed down during the formatting, so Mike felt it might need alignment. He loaded the alignment program, which has seven parts, displayed on a menu and numbered 0 through 6.

(0) SPEED CAL/DEVIATION

Although there is a strobe disk on the drive (much like the one on some hi-fi turntables), a more accurate reading of the drive speed is obtained from a scale on the screen. The speed of my drive 1 was a little off, so Mike adjusted a potentiometer on the PC board, and brought the speed to 300 rpm.

(1) CARRIAGE STEP

This test makes sure the head travels smoothly along its carriage between tracks 0 and 40, without binding.

(2) HEAD RADIAL/AZIMUTH

This test, which checks for centering, requires a special disk with a signal recorded on it for oscilloscope alignment (Mike used a 100-MHz HP 1740A). There's somewhat of an analogy with a hi-fi record; if the hole isn't in the exact center of the record, the sound suffers.

Track 16 is supposed to be in the center of the disk, and the test checks to make sure it is. Instead of using a circular pattern on the disk, alignment is simplified by checking a two-lobe pattern something like this:

Mike looked at the scope while running this test, and made mechnical adjustments on my drive until the amplitudes of the two lobes were equal. Then he stepped the head to track 0 and back, checked to see that the disk was still centered, and stepped the head out to track 39 and back, and did the same check again.

(3) TRACK 00 ALIGNMENT

A mechnical switch makes sure the head starts reading at track 0, which is where the boot track is; if this switch is out of alignment the Model III can't boot up, can't get started.

(4) INDEX/SECTOR TIMING

This test checks the timing of the small

SVA
MAKING APPLES GROW

CP/M • PASCAL • APPLE DOS
AMS 8000
MEGABYTER SYSTEM

The AMS 8000 Megabyter System is for the serious user who wants to expand the capability of his Apple* by increasing online data storage, and reducing disk handling. It brings a new dimension to your Apple, making your data portable to other computers and gives you the reliability associated with IBM standard 8" floppy disks.

The AMS 8000 provides an Apple memory system with ½ to 4 4 Megabytes of removable, online, easy-to-use Apple formatted data ready to plug-in and operate. The system is at home in any setting and matches the styling of your Apple.

The AMS 8000 preserves your current software investment by maintaining rigid compliance with APPLE DOS interface specifications. Since standard Apple DOS commands are used, most software currently running under APPLE DOS 3.2, 3.3, Apple UCSD Pascal 1.1, or Microsoft CP/M 2.2 will run with AMS 8000. Apple mini disks may be used at any time.

Because of the IBM 3740 single density format, you now have the opportunity to exchange data with other computers such as IBM, INTEL, Radio Shack, DEC, etc. or operating systems like CP/M,* UCSD Pascal, etc.

The controller circuitry utilizes a state-of-the-art LSI floppy disk controller and data separator to provide automatic single and double density operation. A proprietary high speed SOFT-DMA data transfer technique guarantees compatibility with all other DMA cards and will not interfere with memory refresh.

For a cost effective, reliable, and software compatible memory system from the originator of 8" floppy disk systems for the Apple, try the AMS 8000 from SVA . . . SVA means Business.

*Trademark Apple Computer. CP/M Trademark Digital Research.

Look what the complete AMS 8000 memory system with its deluxe industrial quality cabinet, reliable industry standard IBM 3740 8-inch floppy disk drives, dual density controller, self-contained power supplies and high density cooling means to you:

INCREASED STORAGE & FLEXIBILITY
- Increase online storage up to 4.4 Mega bytes
- Expand your maximum accounts and file size
- Add high speed efficient hard disk backup

IMPROVED COMPATIBILITY
- Operate with APPLE DOS 3.2, 3.3, CP/M, UCSD Pascal
- Enhance your existing mini-disks and software
- Copy nearly any 8" disk
- Interchange data with other computers

SIMPLIFIED OPERATION
- Utilize standard Apple DOS and DOS commands
- Reduce disk handling and I/O slot usage
- Gain automatic single/double density operation
- Gain automatic single/double sided drive operation
- Change to voice coil drives with one switch

SEVEN DAY BURN IN AND TEST POLICY
- 1 Year Warranty

SVA

SORRENTO VALLEY ASSOCIATES
17722 Sorrento Valley Road
San Diego CA 92121
(714) 452-0101

CIRCLE 241 ON READER SERVICE CARD

hole that is an inch from the center of the floppy disk. Sector timing is provided by a signal picked up by a photocell that detects the light from an LED on the other side of this index hole. My drive had to have its light path realigned, to line up the LED, index hole, and photocell.

(5) HEAD AMPLITUDE

This check on the read/write head detects if it's worn or dirty. The scope amplitude of the head on my drive was only about 160 to 170 millivolts, and should have been greater than 200mV. According to the missing index/sector timing being off, and a worn head.

Rather than replace the head, which is a $90 job because of the time required to make many precise adjustments, Mike followed standard Radio Shack procedure and replaced instead the mechanical portion of the drive, after removing the drive electronics, which are mounted on a PC board. "It's cheaper to change the whole drive mechanism," said Mike, "because the exchange price of the mechanism is $74. Head alignment is time-consuming and tricky."

Although the new drive mechanism had been tested when it was built, Mike ran quick checks on it after installing it in the Model III. What causes head wear? "Normal wear, or dirt grinding away, or excessive use of a head cleaner," said Mike.

(6) RAW DATA CHECK

Mike didn't perform this test, which he does only when there is a source-disk read error or destination-disk write error. He ran the first six tests on my other drive, drive 0, found the speed was OK but adjusted it a little anyway. The lobes were off in test 2, so he adjusted the centering, and also aligned the light path for the index hole.

Diagnostic and Memory Tests

As a final test, Mike ran a diagnostic that writes into each sector on each track, and then verifies what is written, and follows with a memory test of ROM, RAM and video (normal, graphics, and alternate characters). The drives passed these tests, so Mike buttoned up the Model III and put a new warranty sticker over that one screw. The Repair Warranty covers 90 days for parts, 30 days for labor.

Labor time is $15 per half hour. A drive alignment is $25 per drive, a straight charge that includes labor time.

Common Disk-Drive Problems

How often do disk drives have to be aligned? That all depends, of course, on how much you use them, said Mike. The three most common disk-drive problems are those involved with tests 0, 2 and 4: mechanical adjustments of speed, centering, and index light path. The next most common problem is detected by test 5: head amplitude.

If, as some TRS-80 users have done after picking up their repaired computers, you take yours home without the protection of the original packing case, and either lay it on the floor of your car, or on the floor of your commuting train, one or more of those mechanical adjustments may go out of kilter. TRS-80 disk drives aren't like $60 cassette recorders, which can take a lot of bouncing around and still work.

Mike, incidentally, prefers the Model III, "because it has two internal drives and 48K of internal RAM without expensive interfaces, and it has room for boards such as the RS-232."

My thanks to Pat and Mike, who answered all my questions with great patience, in a 90-minute session after the 1:00 closing time on a Saturday last winter.

Beginner's Russian

Two $9.95 cassettes for learning to read Russian are available from your local software dealer, or from Instant Software (Peterborough, NH 03458). They require a 16K Level-II machine, and will run on the Model III.

Beginner's Russian teaches the shapes of 33 Cyrillic letters. You start with seven simple consonants, which are displayed 5/8-inch high, along with brief advice on how to pronounce each. Then you get ten vowels, followed by the third item on the menu, twenty "Words to Translate." These are presented in Cyrillic, and if you didn't memorize the letters, you can repeat menu items 1 or 2, or ask for HELP, which will display an abbreviated letter chart. If you don't quess what the Russian word is, you're asked to try again, and again, which is one way of making you learn the letters.

Consonants of "medium difficulty" are displayed later, as are the names (in Cyrillic) of two famous poets along with short biographies. The last part includes "difficult" consonants (but with no pronunciation help for seven of the eight), and the names and short biographies of Lenin, Stalin, etc. The last display says that if you want to continue the course, "purchase *Everyday Russian*, Stock #0137R."

The tape is interesting, but the author missed a major opportunity to help the user. He could have provided voice recordings of the proper pronunciations, right on the same cassette tape. Perhaps this can even be done as part of the program, with a voice pronouncing each letter after it is displayed, and a machine-language subroutine turning the cassette recorder on and off at the right times.

This would eliminate the need for pronunciation "helps" such as for the letter that looks like "bl" and which is "like the I in 'sin' but pronounced with the lips almost closed."

Everyday Russian

The second Russian tape provides names of foods (drinks, entrees, desserts, etc.), places to eat (restaurant, cafe, etc.), signs, and types of stores. Then it shows the Cyrillic alphabet, and turns the TRS-80 keyboard into a "Russian typewriter"; you press the keys, and Cyrillic characters appear on the screen, so you can write Russian words.

This, and the drill provided for each group of words are the unique features of these two cassettes; the rest can be studied easier, more cheaply and more extensively in a textbook. If the author had provided voice pronunciations on the tape, then these two cassettes could be highly recommended to computerniks. As it is, you're better off buying a record or cassette designed to teach spoken Russian. Nyet pravda?

Music Master

A third $9.95 cassette from Instant Software is *Music Master*, which contains a quartet of programs that will run on the 16K Model-I Level-II or Model-III TRS-80.

Micro Organ provides four octaves and three voices. The second display shows which keys go with which notes and which keys control which octaves and voices. (See Figures 1 and 2.)

Figure 1.

	C#	D#			F#	G#	A#		C#	D#			F#	G#	A#	
	1	2			4	5	6		8	9			:	—	BK	
↑	Q	W	E	R	T	Y	U	I	O	P	@	←	→			
C	D	E	F	G	A	B	C	D	E	F	G	A	B			

Beagle Bros
MICRO SOFTWARE

DON'T BLOW YOUR BUCKS ON Locked-up Software.

Beagle Bros Apple Utilities are BACKUPABLE, LISTABLE, CUSTOMIZABLE and fully compatible with normal DOS.

DOS BOSS
DISK COMMAND EDITOR
by Bert Kersey & Jack Cassidy

A classic utility you will ENJOY! Rename commands: For example, "Catalog" can be "CAT" or anything you want! **Save-protect your programs:** An unauthorized copy attempt can produce a (beep!) "NOT COPYABLE" message. **LIST-protection** too and one-key program selection from catalog. Catalog customizer: **Change Disk Volume message** to your title; Omit or alter file codes. Rewrite error messages: "Syntax Error" can be "Oops!" or "Disk Full" can be "Burp!" or anything! Fascinating educational documentation included; Hours of good reading!

Any or all changes may be appended to your programs, so that anyone using your disks (booted or not) on any Apple will be formatting DOS the way YOU designed it.

$24.00 +1.50 SHIPPING

- ☐ **Dos Boss** on Disk (32K or 48K)
- ☐ Beagle Bros **Apple Tip Book #2**
- ☐ **Peeks, Pokes & Pointers** Chart

Alpha Plot
Hi-Res Graphics/Text Utility
by Bert Kersey & Jack Cassidy

Here are just a few of Alpha Plot's easy-to-use features. Compare price & functions with others on the market—

HI-RES DRAWING: Create pictures and charts with text, on both pages of memory; all images are **appendable to your programs.** Optional Xdraw cursor (see lines before you draw). **Color mixes** and Reverse (opposite of background). Circles, Boxes, and Ellipses, filled or outlined. **Store hi-res in 1/3 disk space.** Redraw any portion of your picture on either hi-res screen. Also **superimpose images** and convert hi-res to lo-res and back for fascinating colorful abstracts!

HI-RES TEXT: Beautiful **upper & lower case** with descenders (no hardware required). Color or reverse characters positionable anywhere (no vtab/htab restrictions). Attractive **proportional spacing** with adjustable height, leading (line spacing), and kerning (letter spacing). Multi-directional typing too for charts!

$39.50 +1.50 SHIPPING

- ☐ **Alpha Plot** on Disk (48K min.)
- ☐ Beagle Bros **Apple Tip Book #4**
- ☐ **Peeks, Pokes & Pointers** Chart

Utility City
21 Useful Utilities on One Disk
by Bert Kersey

21 programming aids that you can list, customize and back-up: **List Formatter** makes properly spaced and indented listings with printer page breaks; each statement on a new line with if-then's and loops called out; a great de-bugger! **Catalog in multiple-columns** and any page-width to printer or screen. Automatically post run-number and last-used DATE in your programs. Write **invisible functioning commands** into your listings. Access program lines in memory for garbage repair and "Illegal" alteration. Quickly alphabetize and store info on disk. Run any program while another stays in memory. Renumber to 65535. Save inverse, trick and **invisible file names.** Convert decimal to hex & binary, or INT to FP. Append programs. Dump text to printer... and MORE!

$29.50 +1.50 SHIPPING

- ☐ **21 Programs** on disk (48K min.)
- ☐ Beagle Bros **Apple Tip Book #3**
- ☐ **Peeks, Pokes & Pointers** Chart

Visit Your Apple Dealer.
Most Apple Dealers carry our software. If yours doesn't, he can get it for you within just a few days through **BEAGLE BROS** or **SOFTSEL.**

OR Order by Phone:
24-Hour **TOLL FREE** Order Desk
Visa, MasterCard or COD* Orders, call:
Nationwide: **800-854-2003** ext.827
California: **800-522-1500** ext.827
Alaska/Hawaii: **800-854-2622** ext.827
(ORDERS ONLY, PLEASE) *COD add $3

Or Mail us a check (or Visa/MC no. & exp.)
- ☐ **Alpha Plot $39.50**
- ☐ **Utility City $29.50**
- ☐ **Dos Boss $24.00**
- ☐ **Apple Mechanic $29.50**

Add $1.50 shipping (any size order) and 6% tax if California. MAIL TO:
BEAGLE BROS, Dept.C
4315 Sierra Vista
San Diego, Ca 92103
Please add $4 shipping outside US/Canada.

All Disks Include: Our famous **PEEKS & POKES** Wall Chart, an indispensable tool, AND a different Beagle Bros **APPLE TIP BOOK**—each one a gold mine of tips and juicy Apple info.

NEW SHAPE TABLE CREATOR

Apple Mechanic
MULTIPLE-UTILITY DISK + TIP BOOK #5 **$29.50**

CIRCLE 111 ON READER SERVICE CARD

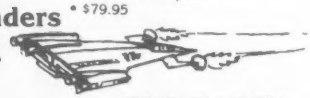
COLOR COMPUTER

COMPUVOICE
Give your computer a voice of its own - build speech into your BASIC programs. This machine language program is a must for your library - no hardware modification needed. $44.95

RAMCHARGER 32K UPGRADE
- EXTEND MEMORY FROM 16K to 32K
- 100% Compatible With Extended Basic
- No Soldering Or Modification
- Fits Inside Computer
- $79.95

Color Invaders

Space War



- The Best Games Available
- High Resolution Graphics
- Fast, Machine Language
- Ext. Basic Not Required
- $21.95 each, cassette
- $25.95 each, disk

THE FACTS
At last, a complete description of the "guts" of the Color Computer. Specs on all the ICs, complete schematics, theory of operation and programming examples. $14.95

EXTENDED BASIC GAMES
- LOTHAR'S LABYRINTH) Word Search Puzzle
- BATTLEFLEET Battleship Search Game (one or two players)
- SPACE TRADERS Galactic trading game

$14.95/ea.

TRS-80
MADNESS & THE MINOTAUR
The best adventure game available for the color computer. Over 200 rooms, 6 creatures, 8 magic spells, loads of treasures. Written in machine language, extended Basic not required. $19.95

NEW MACHINE LANGUAGE GAMES
- COSMIC SUPER BOWL $14.95
  Similar to hand held football games
- PACKET MAN $21.95
  Gobble your way through the maze while avoiding the munchkins.

Complete with high resolution graphics and sound.

- CROID $12.95
  Eliza type artificial intelligence game.

SOUNDSOURCE
Store music or voice from a cassette tape in the computer and display it on the TV screen. Shorten it, lengthen it, modify it and replay it through the TV's sound system. Build and test your own sounds for games. No hardware mods needed. $24.95

UTILITIES
- EDITOR/ASSEMBLER $34.95
- SUPER MONITOR 19.95
- EPROM PROGRAMMER 89.95
  (Program your own ROMs for the ROM-PAC port)
- MAGIC BOX 24.95
  Load MOD I/III Tapes into the color computer
- DISASSEMBLER by Korenthal ... $14.95
  Written in BASIC - generate source and object code for the FACTS.

DEALER INQUIRIES INVITED

SPECTRAL ASSOCIATES
143 HARVARD AVE.
Tacoma, Washington 98466

WRITE FOR COMPLETE CATALOG
ADD 3% FOR SHIPPING $1.00 minimum
Allow 2-3 wks. for delivery
(206) 565-8483
VISA OR MASTERCARD ACCEPTED

CIRCLE 243 ON READER SERVICE CARD

SOFTWARE

FOR YOUR 16K TRS-80 COLOR, MODEL I, III ATARI 400/800, APPLE II

NOW YOUR COMPUTER CAN ACT LIKE A COMPUTER SHOULD!!! WITH OUR MAGNETIC MAGAZINES, YOUR MICRO WILL ENTERTAIN, EDUCATE, AND CHALLENGE YOU.

appletree™

MAGATARI™

TRC™

On cassette or diskette*, you will receive 6-10 programs every month ranging from games, home entertainment, and personal finance, to more of our unique "teaching" programs.
Our next issue will include:

1. **HOME INVENTORY**
2. **Reversi Board Game with Graphics**
3. **Generating Music and Sound Effects**
4. **Machine Language Programming (I)**
5. **Utility of the Month (II)**

You've already missed Stock Market Analysis, Concentration, Checkers, Golf, Algebra and Geometry Tests and Football.☆ Later issues will include Backgammon, Chess, all Tax Schedules, Baseball, and many more. So don't let another issue pass you by! Subscription price for cassette is $50 per year, $30 per ½ year and $10 for a trial issue; for diskette $75 per year, $45 per ½ year, and $15 for a trial issue.
☆(Back issues available on request)

THE COLOR ACCOUNTANT

With our complete home accounting system, keeping track of your finances can be as easy as PI.

1. **Chart of Accounts Maintenance**
2. **Complete Checkbook Maintenance**
3. **Tax Deduction Flags**
4. **Net Worth Statement**
5. **Income Less Expense Statement**
6. **Complete Graph Package (graphs any files)**
7. **Payments and Appointments Calendar**
8. **Home Budget Analysis**
9. **Mailing List**
10. **Schedule 1040 (Long Form)**
11. **Decision Maker**
12. **Schedule G (Income Averaging)**

All programs are menu-driven and allow add/change/delete. Also, all files and statements can be listed to screen or printer, and saved to cassette or diskette. The cost of THE COLOR ACCOUNTANT is $75 for cassette and $80 for diskette. This package requires 16K except for the ATARI 400/800 which requires 24K for cassette and 32K for diskette. THE COLOR ACCOUNTANT also comes with 40 pages of documentation.

the programmer's program

Do you know all the innovative ways of using BASIC commands? The staff at the Programmer's Institute have designed a set of programs explaining everything the manuals omit.
The Programmer's Program leads you step by step through the fundamentals of programming your computer. Then you explore the finer points...**multiple loops, queues, stacks, game programming, sorts, trees, boolean logic, and memory savers.** All these methods make your programming tasks easier and more efficient. Difficult (and very useful) programs are created before your eyes, and designed so you learn at your own speed! **The Programmer's Program is a must for every owner of a microcomputer. ($50 cassette, $55 diskette).**

Order both The Programmer's Program and 1 year's subscription, and the total cost is only $75 cassette, $100 diskette. If you order now, you will receive a Football Program and Computerized Telephone Directory ABSOLUTELY FREE with any $75 order. So don't wait . . . order today!

THE PROGRAMMER'S INSTITUTE

A Futurehouse Company
P.O. Box 3191 Dept. A
Chapel Hill, N.C. 27514
(919) 489-2198 MC & Visa Welcome

Name _____
Address _____
City/St. _____

☐Programmer's Program ☐Year Subscription
☐Color Accountant ☐½ Year Subscription
Type of Computer: ☐Trial Issue
_____ ☐Cassette ☐Diskette

ATARI, TRS-80, and APPLE are trademarks of the Atari, Tandy, and Apple Corp. The Programmer's Program, TRC, Appletree, Magatari, and The Color Accountant are trademarks of the Programmer's Institute.

*All software available on cassette for ATARI 400/800, APPLE II+, MODEL I, III, COLOR. On diskette for ATARI 400/800, APPLE II+, MODEL III.

CIRCLE 219 ON READER SERVICE CARD

TRS-80, continued...

The keys sound, as you play them, through your cassette recorder speaker or an external amplifier/speaker combination. The three voices don't sound at all like the instruments whose names they bear, but more like the trumpet, trombone and flute voices, respectively, of an inexpensive electronic organ. Which in this case isn't bad at all.

Figure 2.

Octaves:	Voices:
A - Lowest (1 Voice)	Z-Organ
B - Middle C (3 Voices)	X-Harpsichord
C - Highest (3 Voices)	C-Piano

Kaleidopy is a combination kaleidoscope and player piano. The computer displays a four-way kaleidoscope graphics pattern and then "plays" that pattern, which sounds somewhat like the random "beep-boop-bop" of space movie robots.

You can change the pattern (and the sound too) either by the menu choices you make, or by rewriting certain lines in the Basic program. The brief booklet also shows how to change the machine language subroutine that creates the sound.

Composer permits generating somewhat random music "in any of fifteen different scales and three tempos," according to the leaflet, which also shows how to alter the machine language sound routine. Interesting, but don't play it very long around computerphobes or Mozart lovers.

Keymania is a game for up to four people very much like the hand-held game that challenges you to remember and repeat a short random tune played by the computer.

Three parameters can be controlled: level of difficulty (selects from 4, 8, or 13 notes); duration of sound (from short to long, with five choices): and interval between notes (from short to long, 1 to 5).

The computer asks how many people are playing, how many notes (from 10 to 50) are to be played each round, and whether you want the notes printed out as you press the keys while trying to duplicate the tune played previously.

Although *Kaleidopy* and *Composer* are mainly of interest to computer music buffs, and *Micro Organ* can be enjoyed by almost anyone, *Keymania* is not only a fascinating game, but can be used for ear-training in teaching music. The computer repeats the group of notes until you press the right keys.

Cheaper TRS-80 Computers

You've probably noticed those ads, in *Creative Computing* and other personal computer publications, offering TRS-80 computers at considerably less than the prices listed in the Radio Shack catalogs.

The 32K Model III with RS-232C interface and two disk drives, which lists at $2495, is advertised variously at $2059, $2100, and $2049.

A 16K Color Computer with Extended Basic, which lists for $599, is available at $459, $495, and $455.

No, they're not Radio Shack stores, these places in small towns in Massachusetts, Michigan, Georgia and elsewhere that advertise these cut-rate prices. That is, they are not owned by the Fort Worth-based company. They are franchised dealers in towns that Radio Shack considers too small to support a regular Radio Shack store. There seem to be about two "dealer and franchise locations in the USA" for every three "USA company stores."

Some Radio Shack catalogs carry a "Radio Shack USA Store/Dealer Directory," with an asterisk beside about 20 to 90 percent of the town names, depending on whether the state is California or Arkansas, for example. The asterisk refers to a line at the bottom of the page: "A Radio Shack Authorized Dealer is located in This Town – May Not Stock Every Item in This Catalog."

Just below is another line: "Retail Prices in this Catalog May Vary at Individual Stores and Dealers." I presume, perhaps wrongly, that all Radio Shack-owned stores charge catalog prices, whereas the dealers set their own prices.

"What brand is that soft drink?"

A Radio Shack dealer, if he sells mail order only, may decide to sell only Radio Shack products. If he has a store, he usually sells Radio Shack products along with non-Radio Shack items, such as hi-fi equipment, or even nuts-and-bolts hardware. Look again at the ads, and you'll see that the cut-rate advertisers are all in small towns, such as Littleton, MA; Milford, NH; Perry, MI; or Cairo, GA.

A Radio Shack company-owned store isn't supposed to sell you a TRS-80 at less than catalog price, or the manager is in trouble, as I understand it. But a franchised Radio Shack dealer, sometimes called a "Radio Shack authorized dealer," can sell a TRS-80 for any price he chooses, even for less than it cost him.

A franchised Radio Shack dealer, located in a small town in Georgia or New England or wherever, and selling mail order, has lower expenses, and can probably make more profit selling a TRS-80 PC-2 at $240 or whatever, than most large Radio Shack stores can at $280.

"Radio Shack prices are reasonable," says an observer of the personal computing scene. "There's another reason why mail order prices are low; they tell you to go to the manufacturer if you have a problem with your TRS-80 during the warranty period."

One way a franchised dealer can make even more profit is, for example, to install cheaper, non-Radio Shack disk drives in the Model III, or to sell you the drive kits and let you do the installation. The dealer will have to service such a machine, as Radio Shack won't. If you have a problem with the keyboard of such a Model III, and take it to a Radio Shack Computer Center, they can refuse to service the keyboard until the "foreign" drives are removed.

If you doubt this, read the service policy at the back of the Model III manual: "If any Radio Shack computer equipment has been modified so that it is not within manufacturer's specifications, including, but not limited to, the installation of any non-Radio Shack parts, components, or replacement boards, then Radio Shack reserves the right to refuse to service the equipment, void any remaining warranty, remove and replace any non-Radio Shack part found in the equipment, and perform whatever modifications are necessary to return the equipment to original factory manufacturer's specifications."

A call to Mark Daniels, president of Computer Discount of America, in West Milford, NJ, brought out this information: If you buy a TRS-80 from CDA and it needs fixing, you "take it to any Radio Shack store." This includes a Model III with disk drives, because CDA sells the III with Radio Shack drives. If you buy a

BYTE-A-BIT COMPUTING CO.
"The Software Specialists"
Introduce....

A NEW 'ARCADE' GAME FOR THE ATARI* COMPUTER

NUMBER STUMPER

FEATURING PLAYER MISSILE, MIXED MODE AND TEXT MODE GRAPHICS, AND SOUND. FOR 1 OR 2 PLAYERS. USES JOYSTICKS . . . 24K CASSETTE $19.95 32K DISKETTE $24.95

"OUR SOFTWARE IS GUARANTEED FOR AS LONG AS YOU OWN IT". IF ANY PROGRAM EVER FAILS TO RUN, WE WILL REPLACE IT FREE!

Call or write for a catalog of our programs and detailed information on our free offerings. Specialists in Software for the Atari® Computer. Games, Utilities and Custom Programming available.

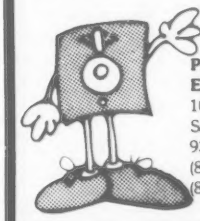
BYTE-A-BIT COMPUTING CO.
28 ORCHID ROAD
LEVITTOWN, N.Y. 11756 • (516) 796-1212
MON.-FRI. 9 A.M. - 6 P.M. • SAT. 9 A.M. - 5 P.M. (EASTERN TIME)
Add $2.50 shipping & insurance. N.Y. residents add sales tax. C.O.D. shipment add'l.

CIRCLE 117 ON READER SERVICE CARD

MEMOREX
FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD!! Call Free (800)235-4137 for prices and information. Dealer inquiries invited and C.O.D.'s accepted.

VISA



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA 93401. In Cal. call (800)592-5935 or (805)543-1037

CIRCLE 204 ON READER SERVICE CARD

EDUCATIONAL SOFTWARE
For the ATARI 400/800 Computers

WORD SEARCH PUZZLE MAKER—Make word search puzzles with your words or ours and an 80-column printer. **24K Cassette: $19.95 24K Disk: $24.95**

MATHFAKS—Reviews simple math facts in the four arithmetic operations. Uses color and sound. Connects to an optional printer or Votrax Type-N-Talk. **16/24K Cassette: $19.95 24/32K Disk: $24.95**

CONCENTRATION—
The concentration program will be available in November or December.

ELECTRONIC GRADE BOOK— The teacher's aid for grade reporting. Includes weighted scores, letter and number grades, and several methods of reporting grades. Disk version has more advanced routines. **$49.95 ea. 32K for Tape; 40K for disk.**

All programs come with a manual. Disk versions come with AUTORUN.SYS file.
Please add $2 postage and handling per order. Michigan residents add 4% sales tax.

Computer's Voice
2370 Ella Dr.—Dept. 130
Flint, MI 48504
(313)-238-5585

CIRCLE 135 ON READER SERVICE CARD

Make Your Dreams Come True With Computer Shopper

Now you can expand your system or get a new one at prices you had never dreamed possible by taking advantage of the thousands of bargains each month in COMPUTER SHOPPER.

COMPUTER SHOPPER is *THE* publication for buying, selling and trading new and used micro and minicomputer equipment, accessories and software.

- Buy, Sell or Trade
- Over 60 **Big** (11" x 14") pages
- Over 20,000 readers nationwide
- Classified ad only 12¢ a word
- Hundreds of ads from individuals
- Money back guarantee

New subscribers are entitled to a *FREE* 50 word classified ad to use for software or used equipment plus a *FREE ISSUE* all for the low subscription price of ONLY $10.00.

SAVE OVER 50% OFF the single copy price of $1.50, Add it up:

12 issues @ $1.50 . . . . . $18.00
One free issue $1.50
Free 50 word classified ad $5.00

TOTAL VALUE $24.50
NOW ONLY $10.00. You save $14.50.
6 month trial, $6.00 Call Toll Free MC & VISA 800-327-9920

COMPUTER SHOPPER
P.O. Box F313 • Titusville, FL 32780
305-269-3211

Yes, I want to save money with Computer Shopper. If I'm not 100% satisfied with my first issue my money will be refunded in full and I get to keep the first issue FREE.

☐ 1 yr. (3rd class) $10.00
☐ I am a new subscriber - send me a certificate for a free classified ad.

NAME _____
ADDRESS _____
CITY _____ ST _____ ZIP _____
OFFER EXPIRES 9/31/82

CIRCLE 131 ON READER SERVICE CARD

— Professional —
REAL ESTATE SOFTWARE
for APPLE, TRS-80 & CPM SYSTEMS

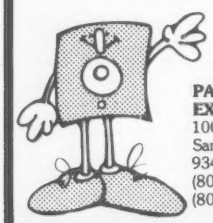
- **PROPERTY MANAGEMENT SYSTEM: $375**
  - Tenant History
  - Late Rent Report
  - Vacancy Report
  - Income Report
  - Auto Late Charge
  - Returned Checks
  - Operating Stmt.
  - Building Reports
  - Utilities Report
  - Tax Expense Report
  - Prints Checks
  - Prints Receipts
- **PROPERTY LISTINGS/COMPARABLES: $325**
  - SCREEN BY
  - 22 Items/Listing
  - 1000 Listing/Disk
  - Listing Memo Field
  - Max/Min Price
  - Units/Zone/City
  - Max Price/Income
  - Max Price/Sq Foot
  - Min Cashflow
- **REAL ESTATE ANALYSIS MODULES: $50/Module**
  - Home Purchase
  - Income Prop Analysis
  - Property Sales
  - Construction Cost/Profit
  - Tax Deferred Exchange
  - APR Loan Analysis
  - Loan Amortization
  - Depreciation/ACRS Analysis
- **WORD PROCESSOR — MAGIC WAND: $265**

Software Realty Company™
At Computer Stores Everywhere or Order COD Direct
Cal Residents add 6% Sales Tax
(213) 372-9419
Suite E, 1116-8th Street, Manhattan Beach, CA 90266

CIRCLE 226 ON READER SERVICE CARD

Verbatim
flexible disks

Call Free **(800) 235-4137** for prices and information. Dealer inquiries invited. C.O.D. and charge cards accepted.



VISA

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800) 592-5935 or
(805) 543-1037.

CIRCLE 204 ON READER SERVICE CARD

1982 ELECTRONIC EXPERIMENTER'S HANDBOOK

Here's a must for any do-it-yourself electronics buff—our new plan-filled guide to practical, fun projects you can build yourself, from video enhancers to ultrasonic sound detectors. Over 30 projects in all—order your copy now!

TO ORDER, send $3.95 ($2.95* plus $1.00 post. & hand.—$5.00 outside U.S.A.) to:
Electronic Experimenter's Handbook
P.O. Box 340, Broomall, PA 19008
*Residents of CA, CO, DC, FL, IL, MA, MI, MO, NJ, NY State, OH, SC, TN and VT add applicable sales tax.

TRS-80, continued...

TRS-80 with non-Radio Shack drives, says Daniels, you must return it to the place from which you bought it if you have problems, because Radio Shack won't service it.

This manifesto was expressed in the Sept. 1981 *TRS-80 Microcomputer News*, in an article by Jon Shirley, vice president of computer merchandising at Radio Shack, who said, in part, "Let's face it, mail order houses do not have local service if they have any at all. They offer a warranty, but to take advantage of it you must ship what you bought back to them. With a Model III disk drive kit, what do you send, the kits you just installed or the entire Model III? It's this lack of convenient service and retail store space that gives them the low overhead and low prices. Or in other words, you get about what you paid for. So caveat emptor," which means 'let the buyer beware.'

What are the advantages of buying from a franchised dealer? Lower prices, says Daniels, plus "you avoid the state tax, if you buy from out-of-state."

One item that adds to the overhead of a company owned store is the commission that salemen get, says Daniels. A mail order dealer pays no commission, thus increasing his profit.

Note that Radio Shack makes the same profit whether, for example, a PC-2 is sold by a dealer for $240 or by a company owned store for $280. Also, it's easier for Radio Shack to ship twenty TRS-80 computers to a dealer than two or three to a company-owned Radio Shack store; this seems to be the usual ratio, according to Daniels.

Sharp Pocket Computer Manuals

The 124-page 26-3501 manual that comes with the Radio Shack PC-1 Pocket Computer (now $159.95, in the RSC-7 catalog) is written too compactly for most beginners, and is best suited for those with previous programming experience.

The six "Sample User's Programs" make a curiously eclectic mix: biorhythm, guess-a-number game, series-circuit impedance, days between dates, random numbers, and normal distribution and percentile. So Radio Shack brought out a $1.95 book of "50 ready-to-run programs in Pocket Basic. Business, education, and home applications." Not having seen this book, I can't comment on the programs or the mix.

However, I have seen the three books that come with the PC-1211 Pocket Computer from Sharp Electronics Corp. The PC-1211 is the same as the PC-1; Sharp makes both; the only difference is the labels.

The 46-page "Beginner's Textbook for Basic" provides the ABC's of Basic, and has a total of two dozen exercises at the end of three chapters, with solutions. This book is quite simple, with only one flowchart and nothing more complex than a one-dimensional array.

The 101-page "Instruction Manual" has many pages that are very much like those in the Radio Shack manual, and in general contains just about the same information, but without the six sample programs.

These six, and 128 more, are contained in the 307-page "Applications Manual," which divides the programs into ten groups: mathematics (simultaneous equations, eigenvalue, etc.), statistics (Poisson distribution, exponential regression), surveying (stadia calculation, closed and fixed traverse), civil engineering (stress, ridge deflection), electronics (series-circuit impedance, self-inductance), more civil engineering (velocity of flow, bending stress), mathematics (points of intersection of two circles, circle tangent to two lines), financial(present value of annuity, depreciation), chemical engineering (viscosity index, heat conduction), and games (cannon shot, treasure hunt). These are all presented in the same compact format as the six sample programs.

The manual for the TRS-80 Pocket Computer has been edited by someone with a more fluent and colloquial knowledge of English than whoever translated the Sharp PC-1211 Instruction Manual from the Japanese. Perhaps someone in Fort Worth reworked the Sharp manual into a lighter, more conversational style. The PC-1211 manual has some odd-sounding or stilted phrases, such as "in case of a number beyond above range" and "be sure to have occasional cleaning of the recording head." However, the translation is excellent most of the time.

All four manuals are printed in Japan, on paper and with typefaces and layouts that look a little odd to Western eyes. Which is not to detract from their being quite good—for the experienced computer user.

The three Sharp manuals are available at some Sharp dealers, at prices set by the individual dealer. The Sharp PC-1211 was available in the spring, from some New York dealers, for $139.95. For $254.95, they were also offering the Sharp PC-1500, identical with the PC-2 that Radio Shack offers for $279.95 in the RSC-7 catalog. As for what manuals accompany the PC-1500 and PC-2, I haven't seen them yet.

Short Program #31: Screen Saver

From Lowell, IN, Jim Peterson sent this:

"I am writing in reference to the *Storing Graphics* subroutine by W.A. Fronek in the Jan. 1982 *Creative* (p. 178). While this program will work, I have a faster routine,

which uses less memory (dimensioning one array instead of two), and will save any alphanumeric characters as well as graphics.

Figure 3.

```
5000 DIM P(1024)
5010 Z=1
5020 FOR A=15360 TO 16383
5030 IF PEEK(A)=32 OR PEEK(A)=128
     THEN 5040 ELSE P(Z)=PEEK(A):
     GOTO 5060
5040 IF PEEK(A+1)=32 OR
     PEEK(A+1)=128 THEN 5070
5050 P(Z)=A+1
5060 Z=Z+1
5070 NEXT A

5100 CLS: INPUT "PRESS ENTER TO
     DUPLICATE SCREEN"; A$

5200 P=15360
5210 FOR A=1 TO Z-1
5220 IF P(A)<192 THEN POKE P,P(A):
     P=P+1: GOTO 5240
5230 P=P(A)
5240 NEXT A
```

"Purpose: This subroutine will save anything displayed on the screen. The codes for characters and graphics are transferred from video memory to the P array. Duplication is very fast when much of the screen is blank. The more the screen is filled, the slower the duplication. Saving of the screen generally takes about 30 seconds.

"Function: Scans video memory and stores the codes in the P array. Blank screen space is stored merely as the last blank location. When the duplication routine (5200-5240) finds a number in P larger than 255 (highest possible code in memory), it skips down to this location and continues with duplication. Unless every screen location is full, P will not be filled.

"This routine can be used with any of the saving routines shown with Fronek's program. Simply write Z and the P array to tape."

If you use Jim's routine, don't forget to add

```
135 B$=INKEY$: IF B$=" "
THEN 140 ELSE 5000
```

if using the first wandering-pixel program (in the Jan. 1982 column), in which 130 is the SET line and 140 is the following line. Actually, this INKEY line can be inserted almost anywhere in the program, but somehow it seems to fit best, logically, after the SET line that puts a pixel on the screen. □

"Human history becomes more and more a race between education and catastrophe."

H.G. Wells

FREE with software purchase — One CPM Handbook

FREE WITH EVERY WORDSTAR—"MICROPRO WORDSTAR TRAINING GUIDE"

DISCOUNT SOFTWARE

Ad#26

ULTIMATE SOFTWARE PLAN

We'll match any advertised price on any item that we carry. And if you find a lower price on what you bought within 30 days of buying it, just show us the ad and we'll refund the difference. It's that simple.

Combine our price protection with the availability of full professional support and our automatic update service and you have the Ultimate Software Plan.

It's a convenient, uncomplicated, logical way to get your software.

✓ (New items or new prices)
* Special price of the month.

CP/M — DISK WITH MANUAL / MANUAL ONLY

CP/M users: specify disk systems and formats. Most formats available.

ARTIFICIAL INTELLIGENCE®
Medical(PAS-3) $849/$40
Dental (PAS-3) $849/$40

ASYST DESIGN®
Prof Time Accounting $549/$40
General Subroutine $269/$40
Application Utilities $439/$40

COMPLETE BUS. SYSTEMS®
*Creator $199/$25
*Reporter $129/$20
*Both $299/$45

COMPUTER CONTROL®
*Fabs (B-tree) $119/$20
*UltraSort II $119/$25

COMPUTER PATHWAYS®
Pearl (level 1) $ 99/$25
Pearl (level 2) $299/$40
Pearl (level 3) $549/$50

DIGITAL RESEARCH®
CP/M 2.2
NorthStar $149/$25
TRS-80 Model II (P+T) $159/$35
Micropolis $169/$25
PL/I-80 $459/$35
BT-80 $179/$30
Mac $ 65/$15
Sid $ 65/$15
Z-Sid $ 90/$15
Tex $ 90/$15
DeSpool $ 50/$10
CB-80 $459/$35
CBasic-2 $ 98/$20

D.M.A.
Ascom $149/$15
Formula $539/$45

GRAHAM-DORIAN®
General Ledger $729/$40
Acct Receivable $729/$40
Acct Payable $729/$40
Job Costing $729/$40
Payroll II $729/$40
Inventory II $729/$40
Payroll $493/$40
Inventory $493/$40
Cash Register $493/$40
Apartment Mgt $493/$40

MICRO-AP®
S-Basic $269/$25
Selector IV $295/$35
Selector V $495/$50

MICRO DATA BASE SYSTEMS®
HDBS $269/$35
MDBS $795/$40
DRS or QRS or RTL $269/$10
MDBS PKG $1295/$60

MICROPRO®
WordStar $319/$60
Customization Notes $429/$na
Mail-Merge $109/$25
WordStar/Mail-Merge $419/$85
DataStar $249/$60
WordMaster $119/$40
SuperSort I $199/$40
Spell Star $175/$40
CalcStar $259/$na

MICROSOFT®
Basic-80 $298
Basic Compiler $329
Fortran-80 $349
Cobol-80 $629
M-Sort $175
Macro-80 $144
Edit-80 $ 84
MuSimp/MuMath $224
MuLisp-80 $174
Multi Plan Call
Manager Series Call

ORGANIC SOFTWARE®
TextWriter III $111/$25
DateBook II $269/$25
Milestone $269/$30

OSBORNE®
General Ledger $ 59/$20
Acct Rec/Acct Pay $ 59/$20
Payroll w/Cost $ 59/$20
All 3 $129/$60
All 3 + CBASIC-2 $199/$75
Enhanced Osborne $269/$60

PEACHTREE®
General Ledger $399/$40
Acct Receivable $399/$40
Acct Payable $399/$40
Payroll $399/$40
Inventory $399/$40
Surveyor $399/$40
Property Mgt $799/$40
CPA Client Write-up $799/$40
P5 Version Add $129
MagiCalc $269/$25
Other less 10%

SOFTWARE WORKS®
*Adapt (CDOS to CP/M) $ 49/$na
*Ratfor $ 68/$na

SOHO GROUP®
*MatchMaker $ 89/$20
*WorkSheet $159/$20

STAR COMPUTER SYSTEMS
✓ G/L, A/R, A/P, Pay $ 359
✓ All 4 $1129
✓ Legal Time & Billing $ 849
✓ Property Mngmt. $ 849

STRUCTURED SYSTEMS®
Business Packages, Call for Price

SORCIM®
SuperCalc $269/$na
Trans 86 $115
Act $157

SUPERSOFT®
Diagnostic I $ 49/$20
Diagnostic II $ 84/$20
Disk Doctor $ 84/$20
Forth (8080 or Z80) $149/$30
Fortran $219/$30
Fortran w/Ratfor $289/$35
C Compiler $174/$20
Star Edit $189/$30
Other less 10%

TCS®
GL or AR or AP or Pay $ 79/$25
All 4 $269/$99
Compiled each $ 99/$25
Inventory $ 99/$25

UNICORN®
Mince $149/$25
Scribble $149/$25
Both $249/$50

WHITESMITHS®
"C" Compiler $600/$30
Pascal (incl "C") $850/$45

"PASCAL"
Pascal/MT+ Pkg $429/$30
Compiler $315
Sp Prog $175
Pascal/Z $349/$30
Pascal/UCSD 4.0 $670/$50
Pascal/M $355/$20

"DATA BASE"
FMS-80 $649/$45
dBASE II $595/$50
Condor II $899/$50

"WORD PROCESSING"
WordSearch $179/$50
SpellGuard $229/$25
VTS/80 $259/$65
Magic Wand $289/$45
Magic Spell $269/$25
Spell Binder $349/$45
Select $495/$na
The Word $ 65/$na

"OTHER GOODIES"
Micro Plan $419/$na
Plan 80 $269/$30
Target $189/$30
BSTAM $149/$na
BSTMS $149/$na
Tiny "C" $ 89/$50
Tiny "C" Compiler $229/$50
Nevada Cobol $179/$25
MicroStat $224/$25
Vedit $130/$15
MiniModel $449/$50
StatPak $449/$40
Micro B+ $229/$20
Raid $224/$35
String/80 $ 84/$20
String/80 (source) $279/$na
ISIS CP/M Utility $199/$50
Lynx $199/$20
Supervyz $ 95/$na
CP/M Power $ 75/$na
Mathe Magic $ 95/$na

APPLE II

INFO UNLIMITED®
✓EasyWriter (Prof) $159
✓Datadex $129
✓EasyMailer (Prof) $129
Other less 15%

MICROSOFT®
Softcard (Z-80 CP/M) $298
Fortran $179
Cobol $499
Tasc $139

MICROPRO®
Wordstar $269
MailMerge $ 99
Wordstar/MailMerge $349
SuperSort I $159
Spellstar $129

PERSONAL SOFTWARE/ VISICORP®
✓Visicalc 3.3 $199
✓Desktop/Plan II $199
Visiterm $ 90
✓Visidex $199
Visiplot $180
✓Visitrend/Visiplot $259
✓Visifile $169

PEACHTREE®
G/L, A/R, A/P, Pay or Inventory (each) $224/$40

"OTHER GOODIES"
*VU #3R (use w/Visicalc) $ 49
*Context Connector (use w/Visicalc) $ 99
Micro Courier $219
Super-Text II $127
Data Factory $134
DB Master $184

16-BIT SOFTWARE

8088 SOFTWARE
✓ Supercalc $269
Call for others

ORDERS ONLY—CALL TOLL FREE VISA • MASTERCHARGE
1-800-854-2003 ext. 823 • Calif. 1-800-522-1500 ext. 823

Outside Continental U.S.—add $10 plus Air Parcel Post • Add $3.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks, C.O.D. $3.00 extra • Prices subject to change without notice. All items subject to availability • ®—Mfgs. Trademark. Blue Label $3.00 additional per item.

THE DISCOUNT SOFTWARE GROUP
6520 Selma Ave. Suite 309 • Los Angeles, Ca. 90028 • (213) 837-5141
Int'l TELEX 499-0446 DISCSOFT LSA • USA TELEX 194-634 (Attn: 499-0446)
TWX 910-321-3597 (Attn: 499-0446)

CIRCLE 152 ON READER SERVICE CARD

m...software legal forum...s

The comments and opinions of the author are given for educational purposes only and are not meant to be legal advice. Specific legal questions should be referred to your personal attorney.

Harold Novick

Politics and Patentable Programs

In the January Software Legal Forum, it was announced that the Patent and Trademark Office (PTO) had capitulated in its fifteen-year general opposition to the patentability of computer programs. Simply stated, the PTO decided to issue formal guidelines to its corps of examiners on what type of computer programs were patentable.

Because the PTO's previous vociferous opposition seemed to have political overtones, it must be speculated that the present Reagan administration with its new Commissioner of Patents and Trademarks, Gerald Mossinghoff, had a great deal to do with this amazing reversal of policy.

However, this month's Forum is to be neither a political nor a historical commentary. Nor will it be a rehash of previous discussions of patent law. Rather, we will discuss the new PTO guidelines and the view today for the application of those guidelines to the criteria for making business decisions.

The question of whether computer programs were patentable subject matter or unpatentable algorithms—an unpatentable tool of science, if you will—was last addressed by the Supreme Court of the United States in the case of *Diamond, Comm'r of Pat. and Trademarks v. Diehr*, 209 U.S. P.Q. 1 (1981).

In what seems to be simply a change of mind, the Court through five of the nine justices held that the patent claim under consideration was "drawn to an industrial process for the molding of rubber products" (patentable) and was not "seeking patent protection for (a mathematical) formula in the abstract" (unpatentable). *Diehr*, 209 U.S.P.Q at 10.

This holding was made in the face of a stinging dissenting opinion written for the remaining four justices by Justice Stevens, the author of the previous Supreme Court Case, *Parker, Acting Comm'r of Pat. and Trademarks v. Flook*, 437 U.S. 584, (98 U.S.P.Q. 193 (1978).

Flook held, according to Justice Stevens, that "unpatentable subject matter was not limited . . . to claims which wholly pre-empted an algorithm . . ."; and that an improved method of calculation, even when employed as part of a physical process, is not patentable subject matter . . ." *Diehr*, 209 U.S.P.Q. at 15.

In spite of the closeness of the decision (and the fact that one of the Justices voting in favor of the patent, Justice Potter Stewart, has been replaced by another, Justice Sandra Day O'Conner), the PTO has proposed that "claims seeking coverage for a computer program would be non-statutory . . . only if, when considered as a whole, they merely recite a mathematical algorithm or a method of calculation." MPEP Sec. 2110.

This proposition, drafted in large part by Supervisory Primary Examiner Mark Nussbaum, appears as a new section 2110 (Patentable Subject Matter-Mathematical Algorithms or Computer Programs) to Chapter 2100 (Patentability) of the Manual of Patent Examining Procedure. The PTO says that "This Manual is published to provide Patent and Trademark Office patent examiners, applicants, attorneys, agents, and representatives of applicants with a reference work on the practices and procedures relative to the

Harold Novick, Patent Attorney, Larson and Taylor, Arlington, VA 22202.

prosecution of patent applications before the Patent and Trademark Office."

However, the magnitude of this shift in PTO position can only be realized when the recent *Diehr* decision is analyzed and the extremity of the prior PTO position is examined. Only two years ago, the PTO had advocated that computer programs were unpatentable subject matter. On what basis you ask? On two different bases, a legal one and a technical one.

In a legal argument, before its reviewing court, the PTO said that the Supreme Court has forbidden patents on algorithms and that "the word *algorithm* as applied by the Supreme Court in [patentable subject matter] cases is not limited to mathematical algorithms, but extends to the general meaning of the word which connotes a step-by-step procedure to arrive at a given result" (emphasis original) *in re Walter*, 205 U.S.P.Q. 397, 405 n.4 (CCPA 1980). This argument was wisely rejected by the Court on the basis that all processes are a step-by-step procedure to arrive at a given result. Thus, such a definition would preempt all processes from being patentable subject matter contrary to the explicit inclusion in the patent laws of process patents as being patentable subject matter.

In a technical argument, the PTO has suggested that *all* computer programs are inherently mathematical and everyone agrees that you cannot patent a mathematical formula. Ergo, all computer programs are unpatentable. The PTO reasoned that all computer programs at their most fundamental level "must necessarily be carried out employing the radix or radices imposed by the architecture of the computer used, binary, binary coded decimal, or the like." *Walter*, 205 U.S.P.Q. at 403.

Again the PTO's reasoning was wisely rejected by the Court. "This statement, if accepted," opined the Court, "would suffice to remove all computer-arts inventions from the scope of [patentable subject matter]. It is itself misleading because it ignores what the computer is doing, concentrating instead on how it is being done . . . An overall characterization of these operations as mathematical is too broad because in concentrating on the minutiae, it ignores the whole." *Walter*, 205 U.S.P.Q. at 408.

Thus, the PTO had its hand slapped twice by the reviewing Court. In the past, however, that did not stop it. The PTO simply appealed those decisions to the Supreme Court (and won!); limited what the reviewing Court said to the particular case and refused to apply that concept generally; or ignored that Court and relied on its own interpretation of the decisions of the higher Supreme Court. But after the *Diehr* case, the PTO reversed course. What did that case say that caused this momentous shift?

In the *Diehr* case, the Supreme Court concluded only that "a claim drawn to subject matter otherwise statutory does not become non-statutory simply because it uses a mathematical formula, a computer program, or digital computer." *Diehr*, 109 U.S.P.Q. at 8. Note, the Supreme Court stated the patentability of computer programs in the negative. Just because a computer program was involved, did not render the invention unpatentable. This does not say that computer programs themselves were patentable. But that is exactly the way the PTO has interpreted the case.

As readers of this Forum know, this author has been saying for a long time that certain pure computer programs should be patentable subject matter. The difficulty now, however, is that politics is the only apparent reason for the complete reversal of the PTO's position and its complete acquiescence to the decisions of its reviewing Court. What Caesar has given, Caesar can take away.

Furthermore, the Supreme Court is not beyond a complete reversal of a prior position based solely on a change in the membership on the Court. Should Justice O'Conner side with the majority in Flook, who were the minority in *Diehr*, the whole Pandora's box can be opened again. At least the PTO will not be opening the box since it has said that it will not bring the question to the Supreme Court again for what would have been a sixth time.

In any event, the position of many has been vindicated and legalized. It is hoped that this position can survive infancy.

New Guidelines

This brings us to the second part of this month's Forum. What are the new PTO guidelines? But first, a quick review of some important terms.

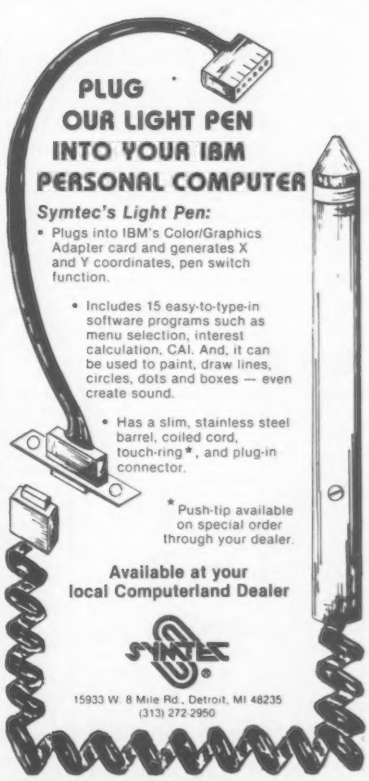
One can patent any new and unobvious invention that is directed at patentable subject matter. To do so, the invention must be completely and fully described so that one of ordinary skill in the area to which the invention pertains would be able to make and use the invention.

In addition the particular metes and bounds, the circumference of the invention, the Venn universe, must be stated in a single sentence in the English language. This sentence is called a "claim," and that term has been repeatedly used above.

For example, the computer invention could be an automated, textual information input, storage and retrieval system accessible by free-form narrative questions. The claim could then be as follows:

INVESTMENT OPPORTUNITY
EXCLUSIVE FRANCHISE IN AMERICA'S MOST PROFITABLE AND DYNAMIC INDUSTRY IS BEING OFFERED FOR THE FIRST TIME IN THIS AREA. INTERNATIONAL COMPANY WILL PLACE QUALIFIED INDIVIDUAL IN "TURN KEY" BUSINESS, TRAIN KEY PEOPLE, PROVIDE INVENTORY, FINANCE YOUR CUSTOMERS, AND PAY YOU THOUSANDS OF DOLLARS "UP FRONT" ON ORDERS WHERE YOUR CUSTOMERS PAY ONLY ON FUTURE ENERGY SAVINGS. EXISTING CUSTOMERS OF OUR FRANCHISEES READS LIKE "WHO'S WHO" OF FORTUNE 500.
IF YOU QUALIFY, YOU WILL BE FLOWN TO LOS ANGELES FOR A TOUR OF INSTALLATIONS AND PERSONAL INTERVIEW. MINIMUM INVESTMENT OF $40,000 TO $100,000. CALL PRESIDENT AT 1-800-323-6556, EXT. R-137 OR WRITE: FEDERAL ENERGY SYSTEMS INC., SUITE 200, 336 N. FOOTHILL RD., BEVERLY HILLS, CALIFORNIA 90210.

CIRCLE 157 ON READER SERVICE CARD


PLUG
OUR LIGHT PEN
INTO YOUR IBM
PERSONAL COMPUTER
Symtec's Light Pen:
• Plugs into IBM's Color/Graphics Adapter card and generates X and Y coordinates, pen switch function.
• Includes 15 easy-to-type-in software programs such as menu selection, interest calculation, CAI. And, it can be used to paint, draw lines, circles, dots and boxes — even create sound.
• Has a slim, stainless steel barrel, coiled cord, touch-ring*, and plug-in connector.
* Push-tip available on special order through your dealer.
Available at your local Computerland Dealer
SYMTEC
15933 W. 8 Mile Rd., Detroit, MI 48235
(313) 272-2950

CIRCLE 249 ON READER SERVICE CARD

Legal Forum, continued...

"I claim: A process comprising the steps of
- storing textual information and dividing it into information units, each unit having a unique number;
- matching the text using a match criteria with a plurality of common words (e.g., I, was, on);
- compiling and storing a general purpose synonym directory and for the stored test a searchonym directory;
- storing and comparing a natural language question concerning the stored text with the common words and saving the mismatched words;
- matching the saved word and its synonym from the question against each word and its searchonym from the text;
- and presenting logical information units according to a priority criteria thereby answering the question. (Developed from the Asija patent 4,270,182 granted May 26, 1981).

This claim cannot be fully understood until each of the words used in it is understood in light of the complete description of the invention. However, it does define what is included in the patent and what is not. It also indicates what changes have to be made to the description of a subsequent invention so that the subsequent invention can be made, used or sold without infringing the patent.

In any event, this claim is not directly or indirectly addressed to a mathematical algorithm. The use of a match criterion or assigning weighted values to an item should also not transform the claim as one being directed to a mathematical algorithm.

Another computer invention, this one for oil prospecting, is directed at producing a cross-sectional geological map depicting the position and shape of subsurface formations from sonic wave signals.

One claim essentially called for a system for converting amplitude-versus-time seismic traces into a number of amplitude-versus-depth traces. The system included data processing means for producing a number of sonograms identified and indexed through respective horizontal pivot coordinates and a represented movement; and automated means for machine dividing each of said individual sonograms into a series of segments in accordance with a seismic velocity function and for placing, storing and indexing also in accordance with the seismic velocity function the series of segments into a series of subsurface zonelets. As thus claimed, it has been conceded that by reciting indexing and storing in accordance with the seismic velocity function, a mathematical algorithm has been indirectly recited. The question: is the claimed invention patentable?

According to the new PTO guidelines, the claim must be considered as a whole. If the claim contains a mathematical formula, directly or indirectly, implements that formula in a structure or process which, when considered as a whole, transforms or reduces an article to a different state or thing, then the claim is directed to patentable subject matter.

However, if the claim is seeking patent protection for the formula in the abstract, it would not be directed to patentable subject matter. It would be unpatentable even if the formula is limited to a particular technological environment, such as oil prospecting.

Similarly, insignificant post-solution activity that is claimed would not be enough. Thus resetting an alarm set point in a computer program that performed a new mathematical equation useable for monitoring the rising temperature in a chemical process is not enough. (This was the *Flook* case.)

In the *Diehr* case, the claimed post-solution activity was to open automatically a rubber molding press, a step clearly tied in with the physical process of rubber molding; thus, patentable subject matter.

On the other hand, preliminary data gathering steps with no significant post-solution activity will not make patentable that which is not. Such a step would be, for example, simply measuring the temperature or the time.

However, if the data gathering is influenced by the mathematical algorithm, then presumably the subject matter as a whole would not be merely directed to solving that equation; hence patentable subject matter.

What about the prospecting claim set forth above? Patentable subject matter? Obviously the claimed information system is for patentable subject matter because no mathematical equation is involved.

On the other hand, one is involved in the prospecting claim. Nevertheless, this claim has been held to be for patentable subject matter. Here, the claimed invention converts one physical thing (a seismic time section) into another physical thing (a seismic depth section). See *In re Sherwood,* 204 U.S.P.Q. 537 (CCPA 1980). Nobody ever said it would be easy.

So, do you rush to the PTO with a patent application for your computer program related invention? The answer is yes if the cost for obtaining a patent (it could easily exceed $5000) is less than the expected economic return or the worth of the computer program. Thus, the computer program would have to be quite valuable, capable of being useable for a long time, desired by others, and fundamental enough so that it cannot be easily circumvented.

But more on the application of the PTO guidelines later. In all cases, however, good patenting. □

Bit Pit

Chas Andres

HEY JACK! THE BIG BOSS WANTS TO SEE YOU - PRONTO!
SPORTS
AT LAST! MY PROMOTION MUST HAVE FINALLY COME THROUGH! GOES TO SHOW YOU JUST WHAT A LITTLE PERSISTANCE WILL DO!
IT'S ABOUT YOUR JOB!
A's A-1 Again!
OUT OF THE NEW DISTRICT MANAGER'S WAY, DICK FRACK!
WHAT MAKES YOU SO SURE THAT YOU WILL GET THE FIRST MANAGER'S OPENING IN 3 YEARS?!
DON'T YOU KNOW WE'RE ALL BEING PHASED OUT TO PAY FOR THAT COMPUTER?
NO COMPUTERS AND NO CLONES ARE GONNA TAKE MY PLACE!
©1982 ANDRES

NO RISK* MAIL ORDER DISCOUNTS *Call for details

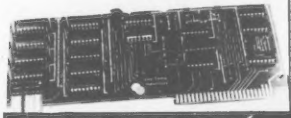
Apple Cards and Hardware

16K RamBoard by ConComp Industries	129
Hayes Micromodem II	299
Novation Apple-Cat	339
Videx Videoterm 80 Column card	249
Videx Keyboard Enhancer	115
Z-80 Softcard by Microsoft	299
16K RamCard by Microsoft	159
Thunderclock Plus clock/calendar card	129
Smarterm 80 column card	299
Corvus Winchester Hard Disk Drives	CALL
ALF 3 Voice Music Card	199
ALF 9 Voice Music Card	149
Lazer Lower Case Plus +	55
Lazer Keyboard Plus +	99
23 Key Numeric Keypad by Keyboard Co	120
Joystick II by Keyboard Co	45
6809 CPU Card (The Mill) by Stellation	319
AIO Serial & Parallel interface by SSM A&T	189
Music System (16 voices)	299
A/D + D/A Interface	279
Expansion Chassis (8 slots)	569
Intrel X-10 Controller Card	169
Clock/Calendar Card	225
CPS Multi-Function Card	175
SuperTalker SD-200	159
Romplus + Card	135
Romwriter Card	149
Symtec Hi-Res Light Pen	210
Sup-R-Fan ventilation system for Apple II	45
Sup-R-Terminal 80 column card by M&R	329
SVA 2VX4 Megabyter 8" Disk Controller	645
SVA 2 + 2 Single Den. 8" Disk Controller	345
Speechlink 2000 by Heuristics	249
Versawriter Digitizer Tablet	229
Asynchronous Serial Interface card by CCS	159
Centronics Parallel Interface card by CCS	119
We carry all California Computer System Cards	CALL

We stock many more items for the Apple II. Please call or write for current price list.

16K RAMBOARD *by ConComp* for Apple II Computers

FOR ONLY **$99**



VIC-20 $249

Personal Computer

Color * Sound * Graphics

Call or write for more info.

Disk drives available soon!

Video Monitors

Amdek/Leedex Video 100 12" B&W	129
Amdek/Leedex Video 100G 12" Green Phosphor	149
Amdek (Hitachi) 13" Color w/audio output	389
NEC 12" Green Phosphor Display JB-1201M	CALL
NEC 12" Lo-Res Color Display	CALL
NEC 12" Hi-Res RGB Color Display	CALL
Sanyo 9" B&W Display	185
Sanyo 9" Green Display	CALL
Sanyo 12" B&W Display	269
Sanyo 12" Green Phosphor Display	285
Sanyo 13" Color Display	449
Zenith 12" Green Phosphor Display	139

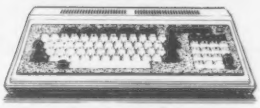
Printers

Anadex 9501 w/2K Buffer	1289
C. Itoh Starwriter F-10	CALL
IDS Prism Printers	CALL
Epson MX-70	CALL
Epson MX-80 & MX-80 FT	CALL
Epson MX-100	CALL
NEC 803 Impact Dot Matrix	629
NEC Spinwriters (Latest models)	CALL
Paper Tiger IDS-560G w/graphics	1099
Qume Sprint Daisywheels (Latest models)	CALL
Diablo 630 Daisywheel 40 CPS	1795

Software for the Apple

VisiCalc version 3.3	149
VisiFile (NEW data base manager)	129
VisiTrend/VisiPlot	219
VisiDex	169
VisiTerm	99
Desktop Plan II	169
DB Master	189
Wordstar (Apple 80-col version) by MicroPro	299
Easywriter Word Processor (80 col)	199
Tax Preparer '81 version	89
Real Estate Analyzer	129
Creative Financing	139
Personal Filing System (PFS)	79
Peachtree Accounting Software	CALL
BPI Accounting Software	CALL
Systems Plus Acctng Software	CALL

NEC Microcomputer



CALL FOR BEST PRICES

The NEC PC-8001A has all these features and much more. Expandibility you want, expandability you get. Through the use of the PC-8012A I/O unit, total system RAM can be extended to 160K. The PC-8031 Dual Disk Drive puts 286K of floppy disk storage at your command.

The NEC PC-8001A has so many things that are options on other computers built right in that you may never have to buy another accessory! The quality that the NEC name has come to stand for has been built-in, too.

Compare the competition, and then call Consumer Computers for the NEC PC-8001.

INVENTORY REDUCTION SALE

Atari Educational Software	CALL
Apple Special Delivery Software	CALL
ALF 9 Voice Music Card	129
CCS S-100 64K Dynamic Ram Card	449
CCS S-100 4 MHz Z-80 CPU Card	229
Centronics 737 Dot Matrix Printer	499
Epson MX-70 Dot Matrix Printer	299
Okidata 82-A Printer W/Tractor	439
Sanyo 12" B&W Video Monitor	220
Sanyo 13" Hi-Res Color Monitor	310

Call or write for special price list for our INVENTORY REDUCTION SALE.

ATARI 800 16K

CALL FOR BEST PRICE

Atari 400 w/16K	349
410 Program Recorder	85
810 Disk Drive	449
825 80 col. 7x8 Dot matric impact printer	699
822 40 col. Quiet Thermal Printer	349
850 Interface Module	159
Atari 16K Ram Module	69
Axlon Ramcram 32K Module	189

AVAILABLE NOW!

IBM® ACCESSORIES

256 K Dynamic Ram Card	CALL FOR BEST PRICES
Hi-Speed Parallel I/O Card	
Hi-Speed Serial I/O Card	
Real-Time System Clock	
*Card Expansion Chassis	

Ordering information: Phone orders using VISA, MASTERCARD, AMERICAN EXPRESS, DINER'S CLUB, CARTE BLANCHE, bank wire transfer, cashier's or certified check, money order, or personal check (allow ten days to clear). Unless prepaid with cash, please add 5% for shipping, handling and insurance (minimum 5.00). California residents add 6% sales tax. Foreign customers please add 10% for shipping. OEM's, institutions and corporations please send for a written quotation. All equipment is subject to price change and availability without notice. All equipment is new and complete with manufacturer's warranty (usually 90 days). Showroom prices may differ from mail order prices.

Send Orders To:

consumer computers Mail Order

8338 Center Drive
La Mesa, CA 92041

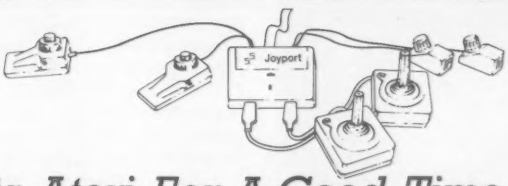
ORDER TOLL FREE 800-854-6654

In California and outside continental U.S. **(714) 698-8088**

FREE SHIPPING* *prepaid cash orders (continental US only)

CIRCLE 139 ON READER SERVICE CARD

JOYPORT



Where Apple Meets Atari For A Good Time

The Sirius Joyport is the most significant input device for the Apple computer since the keyboard. Features include:

- *Easily accessible sockets for 4 Apple-compatible game paddles or 2 Apple-compatible joysticks.*
- *2 sockets for Atari-type joysticks, the ideal game controller for many games.*
- *A switch that selects between Apple game paddles or joysticks and Atari-type joysticks with no re-wiring required.*
- *Completely compatible with BASIC, Pascal and machine language programs and games.*
- *Atari joysticks require a special software driver.*
- *Just a few of the games presently compatible include: All of the new Sirius products, "Destiny" from Continental Software, "Mouskattack" from Online, "Dogfight" from Micro Lab and "Horizon 5" from Gebelli Inc.*
- *Includes a complete user's manual and a FREE copy of Computer Foosball, a hot new game for 1 to 4 players.*

Sirius and Joyport are trademarks of Sirius Software, Inc. Apple is a trademark of Apple Computer Inc. Atari is a trademark of Atari Inc. Sirius is not affiliated with Atari Inc.

Sirius Software, Inc. 10364 Rockingham Drive
Sacramento, CA 95827 (916)366-1195

CIRCLE 236 ON READER SERVICE CARD

ucts...new products...new

APPLE-COMPATIBLE 5-1/4" DISK DRIVE

A.M. Electronics Inc. has announced a 5-1/4" disk drive for Apple computer systems.

The suggested retail price for the 40-track disk drive is $395. An 80-track version is priced at $495.

A.M. Electronics Inc., 3446 Washtenaw Ave., Ann Arbor, MI 48104. (313) 973-2312.

CIRCLE 300 ON READER SERVICE CARD

TV STAND

BYTM Systems, Inc. announces Clear Stand, a TV/Monitor stand for Atari 400/800 and Apple II computers.

The stand is made of clear polished high-impact acrylic. It holds a TV/Monitor up to 15" in screen size. $59.95.

BYTM Systems, Inc., 389 Fifth Ave., (Suite 400), New York, NY 10016.

CIRCLE 301 ON READER SERVICE CARD

LIGHT PEN FOR ATARI

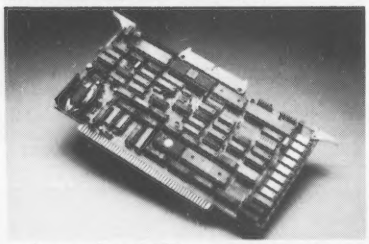
Symtec announces a light pen for the Atari 400/800 and the VIC-20 home computers. The pen is programmable and can activate any software command the Atari or VIC can handle.

The barrel is stainless steel and has a touch-ring that sends a signal to the computer with the touch of a finger or by tapping a metal clip. $150.

Software Etc., 20828 Vermander, Mt. Clemens, MI 48043. (313) 792-3391.

CIRCLE 302 ON READER SERVICE CARD

COMPLETE SYSTEM ON A SINGLE S-100 BOARD

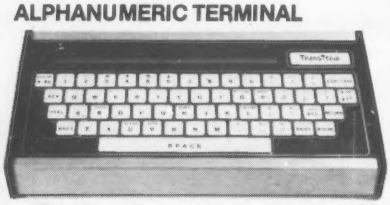


A complete S-100 computer system on a single S-100 board has been introduced by Advanced Micro Digital Coporation. The Super Net board consists of a 64K bank select dynamic RAM, Z-80A CPU, 2716 (2K) monitor EPROM, 5 1/4" and 8" floppy disk controller, two serial and two parallel interface ports and Z-80A CTC for real-time interrupts. Full DMA operation is supported and it meets IEEE-696 specifications and operates under both CP/M and MP/M. $1125.

Advanced Micro Digital Corp., 7201 Garden Grove Blvd., Suite E, Garden Grove, CA 92641. (714) 891-4004.

CIRCLE 303 ON READER SERVICE CARD

THE PORTABLE ALPHANUMERIC TERMINAL



The TransTerm 2 is an alphanumeric keyboard/display terminal intended for portable and/or remote communication environments.

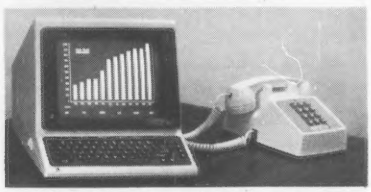
The TransTerm 2 consists of a single line 80-character liquid crystal display and a 58-key TTY style membrane keyboard packaged in a 1.75" high by 12.75" wide by 6.9" deep case.

The unit communicates in full duplex RS-232 serial asynchronous ASCII with 20 ma current loop or RS-422 available as options. One of eight baud rates (110-9600) can be switch selected as can the character parity (even/odd/mark/space) at seven data bits per character.

Computerwise, Inc., 4006 East 137th Ter., Grandview, MO 64030. (816) 765-3330.

CIRCLE 304 ON READER SERVICE CARD

PERSONAL INFORMATION TERMINALS



A line of personal information terminals, with prices starting at under $500, has been introduced by Tymshare, Inc. Called Scanset, the terminals are designed for one-button information access by non-computer professionals.

The Model 410, with automatic computer log-in, sells for $495. The Model 415, with built-in modem, automatic telephone dialer, and automatic computer log-in, is priced at $649.

Built for flexibility and ease of use, the terminals feature user programmable function keys, a 9" diagonal screen with 24 lines of text and 40 or 80-character line lengths; and limited graphics capability.

Up to 12 user-defined tasks can be assigned to the programmable keys, giving the user easy access to host computers or frequently used data bases.

The autodialer feature of the Model 415 can dial up to 36 phone numbers stored in the terminal memory, automatically connecting the terminal to computers or data bases.

Tymshare, 20705 Valley Green Dr., Cupertino, CA 95014. (408) 446-6000.

CIRCLE 305 ON READER SERVICE CARD

MALA

Educational Programs
For Your Pet For Only

$48

For 8 Issue Subscriptions

Each "MALA" comes to you on cassette with 4 brand new programs to load and run on your Pet.

• PET • COMMODORE • VIC •

COMM*DATA SYSTEMS, INC.
P.O. BOX 325
MILFORD, MICHIGAN 48042
(313) 685-0113

• PET • COMMODORE • VIC •

GAMES FOR YOUR VIC
VIC TREK • HANGMAN
TANK • YAHTZEE
DAMSEL • NAB PLUS
AND MANY MORE

only $7.95 Each

FREE Program Summaries available

CIRCLE 122 ON READER SERVICE CARD

TRS-80* Model III

Hardware & Software at discount prices.

COMPUTER HOUSE

RADIO SHACK	List Price	OUR PRICE
26-1066 Mod III, 48 K, 2-Disk	2,495.00	2,100.00
26-1062 Mod III, 16 K	999.00	849.00
26-1906 Invasion Force (T)	14.95	11.95
26-1590 Super Scripset (D)	199.00	155.00
26-1591 Scripset Dictionary (D)	149.00	119.20
26-1569 Mod III Visicalc (D)	199.00	155.00
26-1592 Profile III Plus	199.00	155.00
ADVENTURE INTERNATIONAL		
Star Trek 3.5 (T)	14.95	11.95
Space Intruders (T)	14.95	11.95
Maxi Manager (D)	99.95	79.95
Star Fighter (T)	24.95	19.95
BIG FIVE SOFTWARE		
Robot Attack (T)	15.95	12.75
Cosmic Fighter (T)	15.95	12.75
Attack Force (T)	15.95	12.75
Super Nova (T)	15.95	12.75

(T) = Cassette Tape (D) = Disk

We represent 20+ mfgrs with 300+ programs. Write for our FREE catalog for Mod II, Mod III and Color Computer.

COMPUTER HOUSE
P.O. Box 538 Mammoth Lakes, CA 93546
(714) 934-6538

Orders less than $100.00 add $1.50 for postage and handling. Over $100.00 shipped free. MC & VISA accepted.

*TRS-80 is a trademark of Tandy Corp.

CIRCLE 127 ON READER SERVICE CARD

COMPUTER STATIONS, INC.

11610 Page Service Dr. St. Louis, Mo. 63141

1-800-325-4019 For Technical Assistance 314/432-7120

Direct orders will incur $5.00 shipping & handling charge.

COMPUTER STATION'S . . .
. . . Computer Portrait Subsystem for the Apple II

Computer Station has put it all together. The portrait subsystem allows Apple II owners to create computer portraits that may be heat transferred to create customized T-shirts, posters, and other novelty items. The portrait system is now available for fun or profit.

The Portrait Subsystem requires a 48K Apple II with Applesoft, one disk drive, game paddles, at least one monitor, and either an Epson MX-80 printer with graphics option, or Centronics 739 printer. The subsystem includes the means for creating the portrait on the screen by focusing a video camera on the subject. Two monitors are recommended to view the regular video on one and the digitized image on the other. The game paddles are used to control intensity and contrast so as to be able to create interesting effects as well as clear portraits. The composed digitized picture may be frozen on the screen at any time to view the finished result. The picture may also be saved to disk, if desired. The portrait software allows the digitized picture to be dumped to the printer by simply pressing the "P" key for print. Prior to printing, the entire image is reversed on the screen so as to print a "mirror image" suitable for heat transfer. The printed picture is approximately 9 1 / 2 by 8 inches.

The entire portrait subsystem includes the Dithertizer II™ with video camera for input, the Station Master™ printer interface card with cable, portrait software, and starter supply set including special ribbons. Suggested retail for the Portrait Subsystem is $1175.00.

Computer Station, Dithertizer II, and Station Master are trademarks of Computer Stations, Inc., 11610 Page Service Dr. St. Louis, Mo. 63141

Apple II and Applesoft are registered trademarks of Apple Computer Inc.

CSI

CIRCLE 133 ON READER SERVICE CARD

New Products, continued...

BUSINESS COMPUTERS

Eagle Computer, Inc. announces the addition of two computer systems featuring integral hard disk storage to its line of products for business use.

The Eagle IV offers 7.5 megabytes of formatted hard disk storage capacity and the Eagle V provides 15 megabytes of formatted hard disk storage. The new models are priced at $8995 and $9995 respectively.

The Eagle products incorporate in a single enclosure the CPU, keyboard, full numeric keypad, 12" monitor and floppy and hard disk drives. User storage in the two systems is the equivalent of 5,000 and 10,000 standard 8.5" x 11" pages of typewritten material.

The Eagle systems use the CP/M operating system.

Eagle Computer, 501 Vandell Way, Campbell, CA 95008. (408) 379-5004.

CIRCLE 306 ON READER SERVICE CARD

MEDICAL BUSINESS SYSTEM

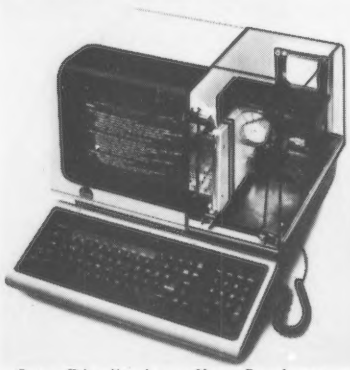
Computers and Information Management, Inc. has a medical business system.

Intern supports clinical records for the doctor; provides scheduling and patient data access for the receptionist; handles billing, general ledger, insurance forms and claims collection for the bookkeeper or accountant; and maintains treatment and medical history information on each of up to 3000 patients. $15,000.

LCIM, 1377 Route 206, P.O. Box 800, Rocky Hill, NJ 08553. (609) 924-8640.

CIRCLE 307 ON READER SERVICE CARD

Z80 OFFICE COMPUTER



Sage Distribution offers Sundance, a Z80-based microcomputer system which incorporates a 5 1/4" rigid disk drive, single board processor, and high density 10-megabyte cartridge tape drive in a compact enclosure designed for the office environment.

The Sundance is fully integrated into a terminal with either 80-character or selectable 80/132-character optional line length. It has 64K dynamic RAM using 16K chips. Parity is automatically generated and checked on each transfer.

Sage Distribution, 5711 Slauson Ave., Culver City, CA 90230. (213) 642-6614.

CIRCLE 308 ON READER SERVICE CARD

CATALOG OF COMPUTER BOOKS

Camelot Publishing Company announces a two-color, 40-page catalog describing their computer books, materials and teacher aids.

Sixty items are described for use by elementary and secondary school teachers, and college instructors. Available for free.

Camelot Publishing Company, P.O. Box 1357, Ormond Beach, FL 32074. (904) 672-5672.

IBM PC

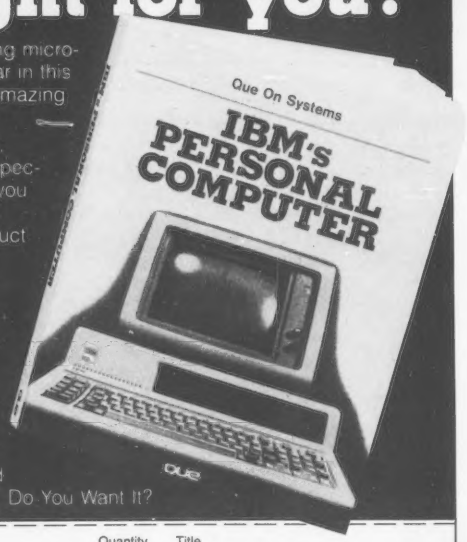
Is it right for you?

Learn about the most exciting microcomputer product of the year in this book that describes IBM's amazing new personal computer.

Whether you are a manager, computer professional, prospective buyer, or programmer, you will find the personal significance of IBM's unique product in this book.

que™

Que Corporation
6515 E. 82nd St., Suite 110
Indianapolis, IN 46250



Other QUE™ books are:
Apple II Word Processing;
CP/M Word Processing; and
Computer Word Processing: Do You Want It?

Quantity	Title	Quantity	Title
_____	IBM's Personal Computer @ $14.95	_____	CP/M Word Processing @ $19.95
_____	Apple II Word Processing @ $19.95	_____	Computer Word Processing @ $14.95

Add $1.50 per book for shipping and handling. Indiana residents add 4% sales tax.

Name _____

Address _____

City/State/Zip _____

Total enclosed $ _____ or charge my ☐Visa ☐Mastercharge ☐Other (specify) _____

Card # _____ Expiration Date _____

Signature _____

Phone orders (317) 842-7163
1-800-428-5331

Available at all computer stores and fine bookstores such as B. Dalton's, Krochs & Brentanos, Stacy's, Coles and Waldenbooks.

Make checks payable to: QUE Corp., 6515 E. 82nd St., Suite 110, Indianapolis, IN 46250

CIRCLE 224 ON READER SERVICE CARD

CP/M FOR APPLE

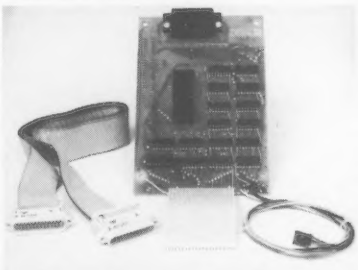
Lobo Drives offers software and hardware for implementation of CP/M on the Apple II. Lobo CP/M (an enhancement of Microsoft CP/M) supports standard, Apple-type mini-floppies, Lobo 8" single- or double-sided, double density floppy systems and Lobo 5 1/4" or 8" hard disk systems.

Features of the Lobo CP/M system include: No decrease in user RAM area; support of the Lobo 5202 and 8202 floppy disk systems; support of the Lobo 950 and 1850 hard disk system; support of standard Apple mini-floppies; and the ability to have all drive types on line at once.

Lobo Drives, 354 S. Fairview Ave., Goleta, CA 93017. (800)344-6103 or (800) 344-6104 from California; outside of California (800)235-1245.

CIRCLE 309 ON READER SERVICE CARD

SERIAL INTERFACE FOR MODEL III



The VR-RS-232C is a plug compatible serial interface for the TRS-80 Model III. It features a programmable baud rate generator from 50-19200 baud; programmable pin out to eliminate special cables (modem output standard); reverse polarity protection; programmable UART; and user prototyping area for special applications, such as, 20ma current loop, relays or lamp drivers.

No soldering or other component level work is required for installation.

VR Data Corp., 777 Henderson Blvd., N-6, Folcroft Industrial Park, Folcroft, PA 19032. (215) 461-5300.

CIRCLE 310 ON READER SERVICE CARD

GRAPHICS DIRECTORY

The 1982 computer graphics directory, covering suppliers of hardware, software, systems and services, is announced by Stanley Klein, directory publisher, who is also publisher/editor of The Harvard Newsletter on Computer Graphics.

A main section lists vendors alphabetically, giving such information as the year founded, address, telephone number, chief executive officer, person to contact, sales, and employees.

A second section is a cross-index, which lists the vendors under specific categories by products and services, type of technology employed, or applications served. $47.

Stanley Klein, Publisher, Computer Graphics Directory, 730 Boston Post Rd., P.O. Box 392, Sudbury, MA 01776. (617)443-4671.

BIBLIOGRAPHY OF COMPUTER-ORIENTED BOOKS

More than 300 new books are listed in the 15th edition of the *Annual Bibliography of Computer-Oriented Books*, recently released by the University of Colorado.

The section on micro and personal computing now contains 45 books.

Despite the deletions of all introductory-type books published prior to 1979, the bibliography contains more than 1,000 books from over 170 publishers. The bibliography separates the books into 63 categories and catalogs them according to type (reference, textbook, handbook) and style of presentation (programmed instruction, case study or narrative). $4.

Computing Newsletter, Box 7345, Colorado Springs, CO 80933.

THE COMPUTER CENTER WITH 1000 DIFFERENCES

There's no shortage of computer retail outlets. And, why not . . . microcomputers are the retailing phenomenon of the '80's.

BUT, what about software?

Now, there's a franchise chain that can offer 1,000 or more software programs to meet the ever-increasing demands of personal and business microcomputer users. For the Programs Unlimited franchisee, this means more than just one-time sales in computers. Programs Unlimited offers an ever-expanding repeat clientele for the software required to broaden and update the capability of their computers.

"The Action's in Software," according to a New York daily newspaper, and Programs Unlimited has the franchise concept that lets you capitalize on this booming business.

We're seeking investors with broad business experience, not necessarily in computers. We'll train qualified applicants, assist in site location and aid in lease acquisition. We'll also provide on-site management training, staff selection, national advertising, trade show participation and a revolutionary inventory program that's uniquely ours. Capital required $162,000-$241,700. Financing available to qualified applicants.

For information and details write: Norman Bander, National Franchise Director, Programs Unlimited, 125 South Service Road, Jericho, New York 11753 or call toll free: 1-800-645-6038.

PROGRAMS UNLIMITED
THE SOFTWARE SUPERMARKET

This advertisement is not an offering. An offering can only be made by Prospectus filed first with the Department of Law of the State of New York. Such filing does not constitute approval by the Department of Law.

CIRCLE 220 ON READER SERVICE CARD

CRC PUBLISHING BRINGS YOU AN EXCLUSIVE
IBM Personal Computer JOURNAL

SOFTWARE REVIEWS
HARDWARE REVIEWS
NEW PRODUCT ANNOUNCEMENTS
TECHNICAL ARTICLES
PROBLEM REPORTING
FORUM
VENDOR DIRECTORY
CLASSIFIED ADS
OWNER INFORMATION EXCHANGE

Subscriptions $18 for 12 issues. Sample copy $2.
Send check or money order to

CRC Publishing

10057 Commerce Avenue, Dept. C , Tujunga, CA 91042

CIRCLE 145 ON READER SERVICE CARD

MARKET ANALYSIS.

Easier...and Faster.

NEW GENERATION!
Programs for your personal computer.

STOCK TRACKER™ uses our technical Volume Force™ analysis to give buy and sell signals on individual stocks, stock options, and commodities. Telecommunications package optional. From $285.

MARKET TRACKER™ is a composite of six technical indicators which tell when the Dow turns bullish and bearish. Its 4-year track record is available. $225.

H & H
TRADING COMPANY
Post Office Box 549
Clayton, CA 94517
415/672-3233

CIRCLE 162 ON READER SERVICE CARD

iews...book re

Steve Gray

Using the Radio Shack TRS-80 in Your Home, by Henniston W. Lord, Jr. Van Nostrand Reinhold Co., New York. 467 pages, hardcover $21.95.

The first 40 percent of the book consists of four chapters: The Computer—Space-Age Home Appliance, How Computers Work (fundamentals of Basic), Developing and Manipulating Data, and Screen Graphics. The last four chapters cover applications in education (repetitive drill, buzzword generator, speed reading), the home (shopping, pantry inventory, drink recipes, fuel-usage history and forecasting, chore reminder, auto maintenance), three games (slot machine, tic-tac-toe, bowling alley), and a personal accounts-payable system (608 lines long).

Chapter Two opens by teaching numeric variables A to Z as addresses of houses on a street. Lord manages to make this simple concept rather confusing, and then adds more confusion by entering these variables into a TRS-80 in calculator mode. Program lines are introduced on the ninth page of the chapter, but by then the average reader may be too confused to go on. If he does, he'll find math operators taught too briefly, relational operators taught with the aid of an overlong and confusing program, etc.

Very few of the application programs are really useful, and many (such as drink recipes) are a waste of computer time. Except for the chapter on graphics (which includes long programs that draw a supermarket floorplan and a chart for meal preparation), the book could just as well be about Microsoft Basic. No particular models of the TRS-80 are discussed, nor is disk memory. Not one RUN is shown; most of the book consists of page after page of listings. An $8.95 paperback edition might be of interest to some readers, but $21.95 is too much money for too little of value.

Operating Systems: Concepts and Principles, by John Zarella. Microcomputer Applications, Box E, Suisun City, CA 94585. 149 pages, paperback $8.95. 1979.

This is the first volume in the projected nine-volume Microprocessor Software Engineering Concepts Series, self-published by Zarella. At least two more have been written, on Word Processing and Text Editing (March 1981, p. 202) and System Architecture.

The series was written, according to the preface, because, "with the advent of microprocessors, of a need...for books which address a level intermediate...to those written for the computer science graduate student and for the programmer attempting to learn a language on a specific computer. The ...Series attempts to explore...topics in a manner that is easily comprehensible to any reader who has a general knowledge of digital computers and programming."

Operating systems are covered in eleven chapters: Introduction; Overview; Tasks, Processes and Concepts; System Services, System Support; Communication and Synchronization; Scheduling; Resource and Memory Management; Input and Output; File Systems; System Security. Two appendices provide a 34-page glossary and a page of ten reference works.

The writing is straightforward, and presents the ABCs of operating systems without getting mired in technical detail (there isn't much room for that, anyway, in only 101 pages of text), yet without writing down to the reader.

views...book

The book provides a basic understanding for those who want only that, and a jumping-off place for readers who want to look further into operating systems. There may well be no other book that treats the subject at this level; all ten of those referenced are fairly complex.

Law and the Computer, by Michael C. Gemignani. CBI Publishing Co., 51 Sleeper St., Boston, MA 02210. 252 pages, hardcover $19.95. 1981.

According to the dust-jacket flap, this book was "written for data processing managers, systems analysts, programmers, software and firmware managers and students in the computer sciences. It...enables you to recognize potential legal problems quickly, determine whether legal assistance is necessary, and communicate your problem effectively to legal counsel."

The six chapters cover an Introduction to the Nature of Law, Contracts, Computer Torts (negligence and malpractice, strict liability, etc.), Legal Protection of Software (copyright, patents, trade secrecy and contracts, etc.), Crime, and Evidence.

Seven appendices provide a guide to legal references and citations, selected sections of the 1976 copyright law, and summaries of five illustrative court cases.

The author writes as clearly and simply as possible, about a subject that could well be murky and complex in the hands of a less capable writer. Dr. Gemignani is chairman of the Dept. of Mathematical Sciences at Indiana Univ./Purdue Univ., and is a member of the Indiana Bar Association.

If you have any more than a passing interest in the law as it applies to computers, you probably won't find an easier and more worthwhile book on the subject, nor one that covers it as fully as this one.

Pet Games and Recreations, by Mac Oglesby, Len Lindsay and Dorothy Kunkin. Reston Publishing Co. (A Prentice-Hall Co.), Reston, VA. 2551 pages, hardcover $14.95, paperback $9.95. 1981.

Five types of games are provided in this "grab-bag of diversions for computer games enthusiasts of all ages and occupations," according to the press release.

After an introductory chapter, you get Plan-Ahead Games (*Tic-Tac-Toe, Reverse, Motie* and six others), Games of Deductive Reasoning (*Hurkle, Martian Hunt* and four others), Games of Chance (*Acey-Ducey, Thrice Dice*), Language and Counting Skills Games (*How Many, Crossword Puzzle, Word Search*) and Recreations (*Starfill, Petsketch* and four others). The book ends with five tutorial "Lectures" by "Professor Whacko," who "introduces many of the mysteries of PEEKS, POKES, and Subroutines, stimulating you to experiment and explore."

Each game presentation starts with the opening CRT display, tells how to play the game, shows additional displays if necessary, then provides a very legible listing (the book contains 139 pages of game listings).

The "how to play" paragraphs are minimal but adequate. Nothing at all is said about how the program works, perhaps because that might have doubled the size (and price) of the book, which is a handy little volume for those who want two dozen games for as little as 35 cents each. For those who don't like to keyboard four to seven pages of Basic lines per game, Reston offers, for an unspecified price, a cassette of ten of the longer games.

FREE!

MICROCOMPUTER IDEA BOOK & CATALOG.

- **One-Stop Shopping.** More than 1000 microcomputer accessories and supplies – from diskettes and line-printer paper to connectors and cables – for Apple, Atari, Northstar, TRS-80s and many others. Loaded with ideas for extra convenience and efficiency.
- **Easy Ordering.** By mail, phone, or TWX. Friendly, helpful, expert assistance.
- **Fast Delivery.** Your order shipped in 24 hours from the Inmac Center nearest you. Overnight emergency shipments also available.
- **Risk-Free Trial.** Try any product for 45 days. If not satisfied, return for full refund.
- **Guaranteed Quality.** Field-tested for precision performance and compatibility. Backed by warranties ranging up to 10 years – and some with Lifetime Guarantees.

SEND TODAY FOR YOUR FREE MICROCOMPUTER IDEA BOOK & CATALOG OR PHONE (408) 727-1970.

inmac

Catalog Dept.,
2465 Augustine Dr.,
Santa Clara,
CA 95051.

CIRCLE 166 ON READER SERVICE CARD

MicroStand™

Standard in Microcomputing Products

AT YOUR LOCAL DEALER OR ORDER DIRECT

DISK CADDY DC-1...why be disorganized when you can be DISKorganized! Let MicroStand's DC-1 solve the problem of practical diskette storage. The DC-1 is constructed of sturdy steel and offers a 100 diskette capacity. Color and texture matched to the Apple, it's a handsome and practical addition to your microcomputer station. Commercial users, ask us about our 8" disk model.

ACCESSORY BRIDGE AB-1...shelves your Epson MX-70/80/100 or Bytewriter printer and keeps paper neatly tucked underneath. Made of sturdy steel and matched to your Apple's color and texture.

DC-1 $49.95 plus $5.00 shipping and handling
AB-1 $39.95 plus $5.00 shipping and handling

VISA

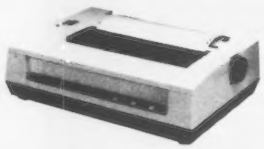
MicroStand
P.O. Box 96
Tolovana Park, OR 97145
1 (503) 436-1429

MasterCard

CIRCLE 188 ON READER SERVICE CARD

PRINTERS

ADS 8001
C. ITOH MODEL 8510A
NEC 8023A-C
(All three models are made by the same manufacturer with identical specifications.)



PRINT FEATURES
Characters: 8 sizes, 5 different alphabets, upper/lower case descenders.
Print Mode: 9x9, exceptional quality combined with proportional spacing.
Graphics: 144x144 dots/in. and block graphics.
Print Head: 9 pins, heavy duty designed with air-cooled fins.
Number of Columns: 136 max.
Print Speed: 120 CPS.
Print Direction: Bidirectional logic seeking.
Throughput: From 52 to 63 l/min.
Line Spacing: Variable to 1/144 in.
Print Width: 8 in. max.
Form: Folded/Sheet.
Form Feed: Tractor and friction, bidirectional.
Width: 4.5 in. to 10 in.
Number of Copies: Original plus 3.

In Stock — Immediate Delivery
Discount Price: ..... **$ Call**

EPSON

MX-80 F/T w/Graftrax **$550.00**
MX-100 ..... **720.00**

INTERFACE/CABLE
Available for 8510/Epson with Apple/Atari/IBM/Osborne/PET/TRS-80.

SOFTWARE

MICROPRO

CP/M Version	List Price	Our Price
WordStar	$495.00	$297.00
MailMerge	150.00	90.00
SpellStar	250.00	150.00
DataStar	360.00	210.00
SuperSort I	250.00	150.00
SuperSort II	200.00	120.00
WordMaster	150.00	90.00
CalcStar	295.00	177.00
Apple Version	**List Price**	**Our Price**
WordStar	$375.00	$225.00
MailMerge	125.00	75.00
SpellStar	200.00	120.00
DataStar	295.00	177.00
SuperSort I	200.00	120.00

SYSTEMS PLUS

Accounting Plus — CP/M Version.
Apple Accounting Plus.

PERSONAL SOFTWARE

IBM PC Version	List Price	Our Price
Visical	$200.00	$170.00
Apple Version		
Desktop Plan II	250.00	159.00
Visiplot	200.00	159.00
Visitrend/Visiplot	300.00	199.00
Visidex	250.00	159.00
Visiterm	100.00	90.00
Visicalc 3.3	250.00	159.00
Visifile	300.00	199.00
Visipak	710.00	570.00

IBM™ PC

- **256K RAM Expansion Card (ADS-5001) Expandable with 64K interval.** w/64K RAM's on board .. **$275.00**
  w/128K RAM's on board ... **425.00**
  w/192K RAM's on board ... **675.00**
  w/256K RAM's on board ... **825.00**
- **16K bit RAM chips (200 ns)...24.00** (ADS-721) 16K byte RAM's — 9 chip kit set.
- **64K bit RAM chips (200 ns).....180.00** (ADS-722) 64K byte RAM's — 9 chip kit set.
- **Visical (IBM PC Version) ... 170.00**

APPLE™ EXPANSION BOARDS

PROMETHEUS

- **MEM-1 (16K RAM Card)** ... **$75.00** Compatible with Z-CARD CP/M™ and all Apple software.
- **VERSAcard™** ..... **$175.00** Serial/Parallel interface, Quartz clock/calendar and BSR Control.

ANTEX DATA SYSTEMS

- **ADS PRT-1** ..... **$60.00** Parallel interface card allows you to interface your Apple computer to any printer that has Centronics compatible interface.

ADVANCED LOGIC SYSTEMS

- **SMARTERM™** ..... **$249.00** 80 column card. Expand your Apple to a full 80 columns with the software commands.
- **Z-Card** ..... **$220.00** Z-80 CPU with CP/M software.

VIDEX

- **Videoterm** ..... **$249.00** 80 column card. Expand your Apple to a full 80 columns with the software commands.
- **Soft Video Switch** **$30.00**

ORANGE MICRO

- **Grappler** **$155.00**

PLOTTERS

HOUSTON INSTRUMENT

HIPLOT™

	List Price	Our Price
DMP-3	$1,385.00	$1,177.00
DMP-4	1,485.00	1,262.00
DMP-6	1,985.00	1,687.00
DMP-7	2,185.00	1,857.00

PEN EXCHANGE KIT

DMP-442 6 PEN	$356.00
DMP-593 8 PEN	456.00

HIPAD™

Most Computers	List Price	Our Price
DT-11	$825.00	$701.00
DT-114	975.00	829.00

APPLE II™ HIPAD

DT-11A	$850.00	$723.00
DT-114A	995.00	846.00

STROBE

- **STROBE PLOT™** ..... **$749.00** Hi-resolution 500 incr./in. drum plotter.

Please call for interface to micro and application software specifications and prices.

TERMINALS

TELEVIDEO

- **Model 910** **$529.00**
- **Model 950** **896.00**

ZENITH

- **Model Z-19** **$795.00**
- **Zenith Green Monitor** .... **115.00** ZVM-121 12-in. tube, switch selectable 40 or 80 characters/line.

Phone orders accepted.
Prices subject to change without notice.
California residents, please add 6% sales tax.
Prices are f.o.b. Mountain View, California.

Payment:
☐ Check ☐ M/C ☐ Visa ☐ C.O.D.

MDT
MICRO DATA TEK
A Division of International Antex, Inc.
2630 California Street
Mountain View, CA 94040
(415) 941-7914
TWX 910-373-8500 "INTERAX PTVY"

CIRCLE 181 ON READER SERVICE CARD

...book reviews...

The Copyright Kit: How to Copyright Your Computer Software, by Noel D. Adler and Steven A. Hovani. National Attorneys' Publications Inc., Box 150, East Setauket, NY 11733. 58 pages, paperback $11.95. 1981.

Written by two members of the New York Bar, this a law-book publisher's "first entry into the computer publishing field...When the reader completes the booklet he should be able to copyright his computer program and the documentation that goes along with it," according to the press release.

The book includes a brief history of the copyright law, compares patents and trade secrets to copyrights, discusses your remedies if your copyright is infringed upon, etc. You are taken step by step through the copyright procedure; sample blank forms and filled-out forms are provided.

The five chapters are: What's It All About (copyright, patent, trade secrets, etc.); Copyrighting Your Software (notice, deposit and registration requirements, works made for hire); Protection from the Copykats (procedure, remedies, proof, permissible copies, fair-use doctrine); Filling Out Form TX; About the Copyright Office, Transfer of Copyright and Correcting Your Registration. Two appendices provide selected sections of the 1976 Copyright Act, and further references.

The language is simple: "Although the program is entitled to copyright protection automatically, it must be Registered in the Copyright Office before you can sue for copyright infringement." This may be the only publication of its kind, and if you write software for sale, it looks like a good investment.

Bugs, by Theodore Roszak. Doubleday & Co., New York. 352 pages, hardcover $14.95. 1981.

This is a curious science fiction mixture of a fairly well written story about the ultimate Luddite dream—shutting down all the computers—and the 1930's-type SF monster.

The basic plot is simple: the director of the government "storage bank for information on millions of citizens" (nicknamed "the Brain"), when interviewed on a children's TV show, jokes about computer "bugs," describing them as real, able to "eat you up...cost you days of work." An impressionable six-year-old girl on the show believes him; "possessing an extraordinary psychic power, she unwittingly materializes her fears into a horrible reality. Soon, workers at the Brain are complaining of itches and skin rashes. Before long, computer centers around the world are being attacked by a plague of killer bugs, tiny creatures that can eat you to the bone in seconds."

Half the story is written moderately well, except that the author doesn't know much about computers, writing of the Brain as consisting of "billions of microprocessors" with "two hundred years of Supreme Court history...reduced to several magnetic memory bubbles."

Science fiction today is far advanced beyond the BEM (Bug-Eyed Monster) plots of the 1930's, and much of it is based on possible or near-possible scenarios. However, the computer bugs are solid "white stuff," without cellular or biochemical structure. If you can suspend disbelief for 352 pages, you may find this novel interesting. But if you insist on being logical, it may exasperate you instead.

views...book

Data File Programming in Basic: A Self-Teaching Guide, by LeRoy Finkel and Jerald R. Brown. John Wiley & Sons Inc., New York. 344 pages, paperback $9.95. 1981.

As one of the latest additions to Wiley's Self-Teaching Guides in Computers and Computer Technology, which consists of 20 books, this is the fifth STG bearing the names of veteran authors Finkel and Brown. They write well, fluently, and often.

The eight chapters cover Basic, data-entry and error-checking routines, and sequential and random-access files. Three appendices provide a 36-page outline of Northstar Basic, a brief glossary of the Basic statements used in the book, and an ASCII chart.

Experienced Basic programmers can skip the first two chapters, which are very helpful for the beginner: Writing Basic Programs for Clarity, Readability and Logic (REMs, formats, modules, subroutines, prettyprinting); and a review of Basic statements.

From chapter three on, the reader learns about field length, null strings, disk storage, cassette files, copying files, changing file data, buffer fields, file conversion, etc. Utility programs are included for letter writing and personal money management.

Self-tests and answer keys take up a large portion of the book, 84 of the 295 pages of text, many of them partly or entirely blank, for writing long programs. Within the text are many additional questions requiring answers to be written in. For the reader willing to do the work, the authors provide a thorough grounding in data files, writing simply and with careful attention to detail.

Computer Consciousness: Surviving the Automated 80s, by H. Dominic Covvey and Neil Harding McAlister. Addison-Wesley Publishing Co., Reading, MA. 222 pages, paperback $5.95. 1980.

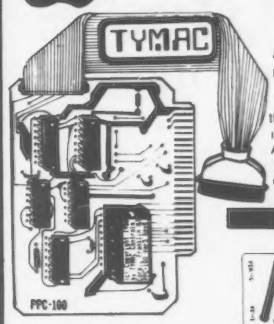
Part of the publisher's "Joy of Computing" series, this could be equally well titled "Computer Literacy" or "The ABCs of Computing." Written by two authors who are heavily involved in medical computing at a hospital and university in Toronto, the book is aimed at "consumers, business people, professionals, educators, and concerned citizens—people who have a stake in their own future" and who "can't afford to be ignorant of the computer technology that increasingly affects their daily lives," according to the back cover.

The dozen chapters are divided into four parts: Preliminaries (Introduction, Computer Systems), Hardware (input/output, memory, CPU, communications, summary), Software introduction, operating systems, languages and application packages), The Whole System (Computer Systems in the Medical Environment, Straining on the Tether of Technology). Each chapter concludes with a biography and a list of new words; a 16-page glossary ends the book.

The simple, largely non-technical "overview" text is enlivened by several dozen educational cartoons. This book would not satisfy the curiosity of most readers of *Creative*—who probably want something more technical and more extensive. However, it does provide what the authors aimed at, a "simple but adequate introduction to computer machinery and programming concepts to people who have no previous knowledge of the subject." □

201 839-3478

APPLE hardware

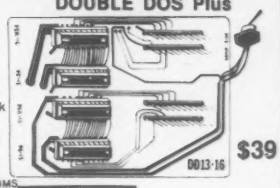


PARALLEL PRINTER CARD

A Universal Centronics type parallel printer board complete with cable and connector. This unique board allows you to turn on and off the high bit so that you can access additional features in many printers. Use with EPSON, ANADEX, STARWRITER, NEC, OKI, and other with standard Centronics configuration

$139.00

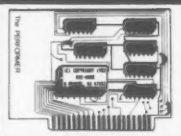
DOUBLE DOS Plus



DOUBLE DOS Plus—a piggyback board that plugs into the disk controller card so that you can switch select between DOS 3.2 and DOS 3.3.

DOUBLE DOS Plus requires APPLE DOS ROMS

$39



The Performer Printer Formatter Board for Epson, OKI, NEC 8023, CITOH 8510 provides resident screen dump and print formatting in firmware. Plugs into Apple slot and easily accessed through PR# command — Use with standard printer cards. $49.00 specify printer

The Mirror — Firmware for Novation Apple CAT II Modem. Emulates syntax of another popular Apple Modem product with improvements. Plugs directly on Apple CAT II Board.

List $39.00 — Introductory Price $29.00

Dealer Dist. Inquires on all Products.

201 - 839-3478

software

APPLE 48K

AGAIN! Ahead of all others.

AUTO-LOAD PARAMETERS
EXPANDED USER MANUAL
TRACK/SECTOR EDITOR
DISK DIAGNOSTICS
PROGRAM MODIFICATION
FAST & MORE ACCURATE

NIBBLES AWAY II

THE ULTIMATE NEW AND IMPROVED DISK BACKUP SYSTEM

NIBBLES AWAY II, second edition, is a greatly enhanced and improved version of our earlier product NIBBLES AWAY. Many new and exciting features have been implemented in NIBBLES AWAY II to insure State of the Art reliability.

Other similar systems on the market today (regardless of price) can't begin to compare with all the features built into NIBBLES AWAY II.

Updates will be made available to all earlier versions through COMPUTER applications for a modest charge of Ten Dollars, to cover manual, Diskette, and Postage & Handling. Include NAME and SERIAL # of ORIGINAL.

ONLY 69.95

Dealer Inquiries Invited.

ENDS THE SOFTWARE BACK-UP BLUES

Mr. Lister — Customer Contact Profiler & Mailer

A Super Mail List Plus more — up to 1000 Entries on single 3.3 Disk (only 1 Drive required) — 2 second access time to any name — full sort capabilities — Dual Index Modes — supports new 9 digit Zip. Easy to follow manual — Not Copy Protected — 4 user defined tables with 26 sort selections per table — Beta tested for 6 months — user defined label generation.

INTRODUCTORY PRICE ~~$135~~. $99.00 Dealer & Dist. Inquiries Invited.

Super PIX HIRES SCREEN DUMP

The Software package that will allow your printer to dump page 1 or page 2 of the Apple Hires screen horizontally or vertically. Use with EPSON® MX-80 with or without GRAFTRAX® Roms, MX-70 — OKI® Microline 80, 82, 83, 82A, 83A — C. ITOH® 8510 and NEC 8023A. Requires Tymac Parallel Printer Board PPC-100, ...$24.95

THE APPLE CARD—Two sided 100% plastic reference card Loaded with information of interest to all Apple owners $3.98

MasterCard VISA

MICRO-WARE DIST. INC. P.O. BOX 113 POMPTON PLAINS, N.J. 07444

CIRCLE 190 ON READER SERVICE CARD

NOW AVAILABLE FOR THE APPLE II

Ali Baba
and the forty thieves

By Stuart Smith

A fantasy role-playing adventure for Apple II and Atari Personal Computers.

Encounter sultans, thieves, fierce and friendly creatures as you guide your alter ego, Ali Baba, through the thieve's mountain den in an attempt to rescue the beautiful princess. Treasure, magic, and great danger await you! One or more human players can guide up to seventeen friendly characters through the many rooms, halls, and caves. Some characters wander around randomly, making each adventure a little different.

ALI BABA AND THE FORTY THIEVES is written in high resolution color graphics and includes music and sound effects. Adventures can be saved to disk and resumed at a later time.

Available for Apple II and Apple II Plus 48K or Atari 800 32K.

On diskette only — $32.95

FOR OUR COMPLETE LINE OF APPLE AND ATARI SOFTWARE PLEASE WRITE FOR OUR CATALOG

ASK FOR QUALITY SOFTWARE products at your favorite computer store. If necessary you may order directly from us. MasterCard and Visa cardholders may place orders by calling us at (213) 344-6599. Or mail your check or bankcard number to the address above. California residents add 6% sales tax. *Shipping Charges:* Within North America orders must include $1.50 for shipping and handling. Outside North America the charge for airmail shipping and handling is $5.00. Pay in U.S. currency.

QS QUALITY SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, CA 91335 (213) 344-6599

CIRCLE 222 ON READER SERVICE CARD

ATARI
A Warner Communications Company

400 16K	$319.00
400 YOURS to 32K or 48K	CALL
800 (16K)	659.00
410 RECORDER	84.00
810 DISK DRIVE	449.00
850 INTERFACE	169.00
830 MODEM	149.00
825 PRINTER	575.00
481 ENTERTAINER KIT	85.00
482 EDUCATOR KIT	125.00
483 PROGRAMMER'S KIT	60.00
484 COMMUNICATOR KIT	309.00

Prices subject to change without notice.
Shipping extra. No tax out of state.
Ca. residents add appropriate taxes.

WE ARE AN AUTHORIZED ATARI SALES AND SERVICE CENTER

COMPUTERTIME, INC.

P.O. Box 216
Kentfield, CA 94914

CALL TOLL-FREE 800-227-2520
In California 800-772-4064

CIRCLE 134 ON READER SERVICE CARD

TERMINALS FROM TRANSNET

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

	DESCRIPTION	PURCHASE PRICE	PER MONTH 12 MOS.	PER MONTH 24 MOS.	PER MONTH 36 MOS.
DEC	LA36 DECwriter II	$1,095	$105	$ 58	$ 40
	LA34 DECwriter IV	995	95	53	36
	LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RO	2,095	200	112	75
	VT100 CRT DECscope	1,695	162	90	61
	VT101 CRT DECscope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECscope	1,745	167	98	63
	VT132 CRT DECscope	1,995	190	106	72
	VT18XAC Personal Computer Option	2,395	230	128	86
TEXAS INSTRUMENTS	TI745 Portable Terminal	1,595	153	85	58
	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI Insight 10 Terminal	695	67	37	25
	TI785 Portable KSR, 120 CPS	2,395	230	128	86
	TI787 Portable KSR, 120 CPS	2,845	273	152	102
	TI810 RO Printer	1,695	162	90	61
	TI820 KSR Printer	2,195	211	117	80
LEAR SIEGLER	ADM3A CRT Terminal	595	57	34	22
	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
	ADM42 CRT Terminal	1,995	190	106	72
DATAMEDIA	EXCEL 12 CRT Terminal	1,695	162	90	61
	EXCEL 42 Smart Buffered CRT	995	96	54	36
	COLORSCAN 10 Color CRT	3,195	307	17[illegible]	116
TELEVIDEO	925 CRT Terminal	850	82	46	31
	950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER	Letter Quality, 7715 RO	2,895	278	154	104
	Letter Quality, 7725 KSR	3,295	316	175	119
GENERAL ELECTRIC	2030 KSR Printer 30 CPS	1,195	115	67	43
	2120 KSR Printer 120 CPS	2,195	211	117	80
HAZELTINE	Executive 80/20	1,345	127	75	49
	Executive 80/30	1,695	162	90	61
EPSON	MX-80 F/T Printer	745	71	42	27
	MX-100 Printer	895	86	48	32
TIMEPLEX	E0400 4 Channel Stat Mux	1,525	147	82	55
	E0800 8 Channel Stat Mux	2,050	197	110	74

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

MICROCOMPUTERS
APPLE • COMMODORE • HP85 • DEC LSI 11

ACCESSORIES AND PERIPHERAL EQUIPMENT
ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS

TRANSNET CORPORATION
1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800
TWX 710-985-5485 800-526-4965 OUTSIDE N.J.

CIRCLE 253 ON READER SERVICE CARD

IMB
TRS-80 16K COLOR GAME
LIMITED OFFER!
FREE WE'LL SEND YOU OUR BONUS GAME OF THE MONTH WHEN YOU BUY ANY 2 GAMES
NEW ARCADE GAME
16K COLOR EXTENDED HI-RESOLUTION GAMES**
GATOR ZONE
THE FIRST ANTI-PREPPY COMPUTER GAME WHERE YOU'LL FIGHT OR LOSE YOUR SHIRT!
$18.95
STARBASE ATTACK $12.95
METEOR STORM $12.95
HIGH SPEED ARCADE GAME
KOSMIC KAMIKAZE $18.95
IMB GALLOPING GAMBLERS EACH
illustrated memory banks
P.O.BOX 289
WILLIAMSTOWN, MA. 01267-0289
Master Card and VISA accepted.
*TRS 80 is a TM of Tandy Corp.
TEL.413-663-9648
**CASSETTE
CERTIFIED CHECKS OR MONEY ORDERS ONLY
PHONE ORDERS — CALL MON-FRI 9-5 EST

CIRCLE 165 ON READER SERVICE CARD

NEW 23K
PERSONAL COMPUTER
$239.00 FACTORY SALE PRICE

You get the NEW APF IM-1 Full Size Powerful Computer: Includes 14K ROM with Level II BASIC built in, 9K user RAM, Color, Sound, Professional 53 keyboard, Two Controllers, Two 10 key numeric pads, High speed cassette, A.C. Adapter, RF Modulator, T.V. Switchbox. Accepts TAPE-DISK-PLUG IN CARTRIDGES. It is PLUG IN EXPANDABLE at low cost. 90 day parts and labor warranty, owner's guide, BASIC language manual. All this in a beautiful black and white console case for only $239.00.
15 DAY FREE TRIAL Return within 15 days complete and undamaged for refund of purchase price.
PROTECTO ENTERPRIZES
BOX 550, BARRINGTON, IL 60010
TO ORDER PHONE 312/382-2192

CIRCLE 260 ON READER SERVICE CARD

STAR WARE
*Everything for the IBM**

★ **SOFTWARE**
Integrated Accounting System
(G/L, Payroll, A/P, A/R) $395
Listpro™ (for custom form letters) $95
Mail Manager™ $49
Microstat (complete statistical package) $250
Ptofsale™ (order processing system) $195
WordStar* (word processing) $495
. . . and much more.

★ **HARDWARE**
Color printers, monitors, modems, hard discs, light pens, joysticks, and more.

★ **DISKETTES**—with free game 10 for $49
50 for $169
★ **SOFTWARE CONVERSION**—Call for rates
★ **Authors Wanted**—Dealer inquiries invited.

Suite B1A, 3901 Davis Place NW
Washington DC 20007 (202) 337-5300
* IBM is a trademark of International Business Machines Corporation. * WordStar is a trademark of MicroPro International Corporation.

CIRCLE 244 ON READER SERVICE CARD

creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** $1.50. **EXPAND-AD®:** $2.25. Ads set in all bold type @ 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card — Am. Ex., Diners, MC, VISA (include exp. date) — or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016. Direct inquiries to Candi Huggins, (212) 725-3927.

SOFTWARE

DOS PLUS — SPANISH VERSION — $169.95. For TRS-80. Computers 101, 101 Hollywood Fashion Center, Hollywood, Fla. 33023. (305) 981-1011. Looking for Dealers/Distributors.

GENEALOGY — Unlimited system for Apple II. User Friendly Systems, Inc. 6135 Ross Rd., Fairfield, Ohio 45014.

TRS-80 SOFTWARE BOOKS. This month's special: IJG other mysteries book $21.95 plus $2.00 shipping/handling. Catalog $1.00. Send check/money order to: Applied Software, 11 Dickens Ave., Dixhills, N.Y. 11746. (516) 242-7899.

TRS-80, Atari, TI-99/4 Software: Science, Mathematics, Astronomy, Music, Education, Curve Fitting, Fourier Analysis, Statistics, Graphics, Finance; Benchmark, P.O.B. 385, Providence, Utah 84332.

COMPUTER EQUIPMENT

USED COMPUTER TERMINALS. Printers, Modems, Surplus Electronic Parts. Catalog $1.00. SPECIAL: Daisy Wheel Printer $400.00. RONDURE COMPANY, THE COMPUTER ROOM, 2522-CC Butler St., Dallas, TX 75235. (214) 630-4621.

ELEPHANT MEMORY SYSTEMS 5" DISKS — LOWEST PRICES! (10/box). Single side: $21.96; 20.96/2+; double density $24.96; 23.96/2+. Double side/density $32.49; 30.96/2+. Shipping $2.00 per order. Single density soft sectored. Double density soft, 10, or 16 sectors (specify). Add NJ sales tax if applicable. Direct-to-Tape Recording Company, 14 Station, Haddon Heights, NJ 08035.

SAVE 90%, $150.00 for a Z80A system with 64-KB of memory and a real front panel or $200.00 for a 24x80 full function CRT!. Roll your own Technology and save!. FREE DETAILS. Digatek Corporation, 2723 West Butler Drive, Suite 33, Phoenix, AZ 85021.

IBM PERSONAL COMPUTER and 8088 boards and plug-ins in kit form. Build it yourself and save. Free information. Compatible Computer Corp., Dept. CC2, Box 51102, Seattle, WA. 98115.

OPTICAL COMMUNICATOR or Data Link receiver, Transmitter; all electrical parts, lenses, instructions, $9.95 each. Both $18.50. Specify digital or analog. Peko, Box 5476, Sherman Oaks, CA 91413.

BUSINESS SOFTWARE

PROVEN BUSINESS SOFTWARE FOR MA/COM OSI. CLIENTIME: Time keeping and client billing for the professional. DMS-WHIP: Inventory, order entry, invoicing, accounts receivable. A FAST Multi-User system. MEDPAK: Complete A/R System for the medical practice. Billing, insurance forms, collections. DMS-OPEC: Oil Wholesaler inventory system. DMS-WHIP plus. All systems OS-DMS level 3 compatible. Specifications, reports, references on request. Demo packages $50.00 each. I/O ASSOCIATES, INC., 210-C Law and Commerce Building, Bluefield, W.V. 24701. (304) 327-6583.

HOW CAN YOU DRAW more attention to your Expand-ad®? Put it in all BOLD type! Call (212) 725-3927 for more information.

COMPUTER PUBLICATIONS

TRS-80 WEEKLY NEWSLETTER. $1.00 for sample, write 80 Newsletter, 3001 Route 27, Franklin Park, N.J. 08823.

COMPUTER SHOWS

NEW JERSEY COMPUTER SHOW AND FLEA MARKET, September 11-12 in Newark, Info Phone (201) 297-2526.

GIVE your REGULAR CLASSIFIED ad more impact — put it on a screened background like this! Call (212) 725-3927 for more information.

YOUR Expand-Ad® will stand out best in all BOLD type on a BENDAY background like this! Call (212) 725-3927 for more information.

CLASSIFIED ADVERTISING ORDER FORM

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15 (MINIMUM)
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

Please refer to heading on first page of this section for ad placement information

REGULAR: $1.50. **EXPAND-AD®:** $2.25

OF WORDS _____ # OF INSERTIONS _____

☐ PAYMENT ENCLOSED $ _____

☐ CHARGE You will be billed monthly ☐ American Express ☐ Diners ☐ Visa ☐ MasterCharge-Interbank # _____

Account # _____ Exp Date _____

SIGNATURE _____

PRINT NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____ C C782

creative computing RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY

TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-7226

ARIZONA

PHOENIX — HEATHKIT ELECTRONIC CENTER, 2727 W. Indian School Rd. (602) 279-6247. Heath/Zenith Computers, Software, Peripherals.

TUCSON — HEATHKIT ELECTRONIC CENTER, 7109 E. Broadway. (602) 885-6773. Heath/Zenith Computers, Software, Peripherals.

CALIFORNIA

D.E.S. DATA EQUIPMENT SUPPLY — 8315 Firestone, Downey 90241. (213) 923-9361. VICVILLE: (714) 778-5455. Commodore PET, Vic 20 specialists. Latest Software, Hardware, Books, Supplies, Peripherals in stock. In House Maintenance.

OMNI UNLIMITED; 105 S. Los Robles; Pasadena; 91101; 213 - 795-6664; Commodore, Zenith, Otrona, Victor, Supplies/Peripherals.

ANAHEIM — HEATHKIT ELECTRONIC CENTER, 330 E. Ball Rd. (714) 776-9420. Heath/Zenith Computers, Software, Peripherals.

CAMPBELL — HEATHKIT ELECTRONIC CENTER, 2350 S. Bascom Ave., (408) 377-8920. Heath/Zenith Computers, Software, Peripherals.

EL CERRITO — HEATHKIT ELECTRONIC CENTER, 6000 Potrero Ave., (415) 236-8870. Heath/Zenith Computers, Software, Peripherals.

LA MESA — HEATHKIT ELECTRONIC CENTER, 8363 Center Dr., (714) 461-0110. Heath/Zenith Computers, Software, Peripherals.

LOS ANGELES — HEATHKIT ELECTRONIC CENTER, 2309 S. Flower St., (213) 749-0261. Heath/Zenith Computers, Software, Peripherals.

POMONA — HEATHKIT ELECTRONIC CENTER, 1555 N. Orange Grove Ave., (714) 623-3543. Heath/Zenith Computers, Software, Peripherals.

REDWOOD CITY — HEATHKIT ELECTRONIC CENTER, 2001 Middlefield Rd., (415) 365-8155. Heath/Zenith Computers, Software, Peripherals.

SACRAMENTO — HEATHKIT ELECTRONIC CENTER, 1860 Fulton Ave., (916) 486-1575. Heath/Zenith Computers, Software, Peripherals.

WOODLAND HILLS — HEATHKIT ELECTRONIC CENTER, 22504 Ventura Blvd., (213) 883-0531. Heath/Zenith Computers, Software, Peripherals.

COLORADO

DENVER — HEATHKIT ELECTRONIC CENTER, 5940 W. 38th Ave., (303) 422-3408. Heath/Zenith Computers, Software, Peripherals.

CONNECTICUT

COMPUTERWORKS — 1439 Post Rd., East Westport 06880; (203) 255-9096. 12-6 Tues.-Fri., 12-9 Thu., 10-5 Sat.

CONNECTICUT INFORMATION SYSTEMS — 218 Huntington Road, Bridgeport 06608; (203) 579-0472. Mon-Sat. 10am-6pm. Apple and CP/M-related products.

THE COMPUTER STORE, 21 Atlantic St., Stamford, 06901. (203) 356-1920. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 683 Silas Deane Hwy, Wethersfield, 06109. (203) 563-9000. Apple, Zenith, Sanyo, Diablo, Epson.

AVON — HEATHKIT ELECTRONIC CENTER, 395 W. Main St. (Rt. 44), (203) 678-0323. Heath/Zenith Computers, Software, Peripherals.

DELAWARE

THE COMPUTER STORE, 4010 Concord Pike, Rt. 202 North, Wilmington, 19803. (302) 478-7772, Apple, Zenith, Sanyo, Diablo, Epson.

MICRO PRODUCTS, 401 Philadelphia Pike, Wilmington, 19809, (302) 762-0227, Major brands of Hardware, Peripherals and over 75 Software lines represented.

FLORIDA

COMPUTERS 101 - 101 Hollywood Fashion Center, Hollywood, FL. 33023. (305) 981-1011. Atari, Zenith, TRS-80, NEC, Xerox, Centronics, Epson, All Printers: Sales and Service. SPANISH SOFTWARE.

HIALEAH — HEATHKIT ELECTRONIC CENTER, 4705 W. 16th Ave., (305) 823-2280. Heath/Zenith Computers, Software, Peripherals.

JACKSONVILLE — HEATHKIT ELECTRONIC CENTER, 8262 Arlington Expressway. (904) 725-4554. Heath/Zenith Computers, Software, Peripherals.

PLANTATION — HEATHKIT ELECTRONIC CENTER, 7173 W. Broward Blvd., (305) 791-7300. Heath/Zenith Computers, Software, Peripherals.

TAMPA — HEATHKIT ELECTRONIC CENTER, 4109 W. Hillsborough Ave., (813) 886-2541. Heath/Zenith Computers, Software, Peripherals.

GEORGIA

ATLANTA COMPUTER MART — 5091 Buford Hwy., Atlanta 30340; (404) 455-0647. 10-6 Mon.-Sat.

ATLANTA — HEATHKIT ELECTRONIC CENTER, 5285 Roswell Rd., (404) 252-4341. Heath/Zenith Computers, Software, Peripherals.

ILLINOIS

COMPUTER LAND/DOWNERS GROVE — 136 Ogden Ave., Downers Plaza 60515; (312) 964-7762. 10-6 Mon.-Sat., 10-8 Tue., Thurs. Apple, Atari, Osborne, Xerox, IBM Personal Computer, Fortune.

FARNSWORTH COMPUTER CENTER — 1891 N. Farnsworth Ave., Aurora 60505; (312) 851-3888. 10-8 Mon.-Fri., 10-5 Sat. Apple, Hewlett-Packard series 80 systems, HP Calculators, IDS Printers.

LIBERTYVILLE VIDEO AND COMPUTER CENTER; 872 So. Milwaukee Ave; LIBERTYVILLE; 312-367-8660; open 7 days; Atari Computers, Hardware/Software.

THE COMPUTER ROOM, 638 North Michigan, Chicago, IL. 60611. (312) 337-6744. Apple, Televideo, Osborne. Business Program Specialists.

COMPUTER JUNCTION — 543 S. York Rd., Elmhurst 60126. (312) 530-1125. Strong support on Apple, Atari, Xerox, NEC. Software/Hardware.

VIDEO ETC., 465 Lake Cook Plaza, Deerfield, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, Orland Park (312) 460-8980, Buffalo Grove, (312) 459-6677, strong Hard/Software support for Apple, Atari.

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg, 60195. (312) 397-8708. 12-9 Tues. - Fri., 10-5 Sat. Apple, Alpha Micro, Hewlett-Packard calculators. Largest book and Magazine selection.

MARYLAND

COMPUTERS, ETC. . . 13A Allegheny Ave., Towson, 21204. (301) 296-0520; 9330 Georgia Ave., Silver Spring, 20910. (301) 588-3748, 257 West St., Annapolis 21401. (301) 268-6505. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

BASIK COMPUTERS INC. 307 North Frederick Avenue, Gaithersburg, 20877, (301) 840-0412, all Hardware/Software compatible with Apple, at discounts.

BALTIMORE — HEATHKIT ELECTRONIC CENTER, 1713 E. Joppa Rd., (301) 661-4446. Heath/Zenith Computers, Software, Peripherals.

ROCKVILLE — HEATHKIT ELECTRONIC CENTER, 5542 Nicholson Lane. (301) 881-5420. Heath/Zenith Computers, Software, Peripherals.

MASSACHUSETTS

NEECO — 679 Highland Ave., Needham 02194; (617) 449-1760. 9-5:30 Mon.-Fri. Commodore, Apple, Superbrain, Atari.

SCIENCE FANTASY BOOKSTORE — 18 Eliot St., Harvard Sq., Cambridge 02138; (617) 547-5917. 11-6 Monday-Saturday; till 8 Thursday. Apple, Atari TRS-80 games.

THE COMPUTER STORE, 120 Cambridge St., Burlington, 01803. (617) 272-8770. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 1678 Mass. Ave. Cambridge, 02138. (617) 354-4599. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 680 Worcester Rd, Framingham, 01701. (617) 879-3720. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 103 Devonshire St., Boston, 02109. (617) 426-4385. Apple, Zenith, Sanyo, Diablo, Epson.

PEABODY — HEATHKIT ELECTRONIC CENTER, 242 Andover St. (617) 531-9330. Heath/Zenith Computers, Software, Peripherals.

WELLESLEY — HEATHKIT ELECTRONIC CENTER, 165 Worchester Ave. (617) 237-1510. Heath/Zenith Computers, Software, Peripherals.

MICHIGAN

COMPUTER CENTER — Garden City; (313) 425-2470 & West Bloomfield; (313) 855-4220; Hewlett-Packard Computers/Calculators, Apple, North Star. Large Selection of Software/Hardware.

NEVADA

HOME COMPUTERS — 1775 E. Tropicana #6, Las Vegas 89109; (702) 798-1022. Mon.-Sat. 10-7 Apple, Commodore, Atari, Hardware/Software, Books & Service.

NEW HAMPSHIRE

COMPUTER MART OF NEW HAMPSHIRE, 170 Main St., Nashua, 03060. (603) 883-2386. THE Apple Specialists. Full line Hardware/ Software. Training Service.

NEW JERSEY

THE COMPUTER UNIVERSE — 155 Route 17S., Paramus 07652; (201) 262-0960. Mon; Wed; Fri., and Sat., 10-6. Tues., and Thurs; 12-9. 23 Rt. 206, Stanhope 07874 (201) 347-7892 Tues. & Thurs. 12-9; Wed., Fri. & Sat. 10-6. Specializing in Apple Computers.

SOFTWARE CITY, PINE BROOK — 101 Rt. 46 East, 07058; (201) 575-4574. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

SOFTWARE ASYLUM, INC., 626 Roosevelt Ave., Carteret. 07008. (201) 969-1900. M-Sat: 10AM-9PM; Sun: 11AM-6PM. Huge selection for Atari — up to 25% discount.

STONEHENGE COMPUTER CORP., 89 Summit Ave., Summit 07901. (201) 277-1020. 10-6 M.-F., 10-5 Sat. Apple, Canon, Wicat. Authorized Dealer. Sales and Service.

COMPUTERLAND, 35 Plaza, Rt. 4 West, Paramus, 07652. (201) 845-9303. Apple, IBM, Vector Graphic, etc. We know small computers.

COMPUTERS , ETC. . . Plaza 38 Center, Rt. 38, Cherry Hill, 08002. (609) 779-0023. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

SOFTWARE CITY, TEANECK — 161 Cedar Lane, 07666. (201) 692-8298. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

SOFTWARE CITY, GREENBROOK — 60 Route 22 West, 08812. (201) 968-7224. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

ASBURY PARK — HEATHKIT ELECTRONIC CENTER, 1013 State Hwy. 35; (201) 775-1231. Heath/Zenith Computers, Software, Peripherals.

FAIR LAWN — HEATHKIT ELECTRONIC CENTER, 35-07 Broadway (Rt. 4), (201) 791-6935. Heath/Zenith Computers, Software, Peripherals.

NEW YORK

SOFTWARE CITY, ARMONK — 146 Bedford Rd, 10504. (914) 273-3677. Bus/Rec/Utility Home programs for most microcomputers. Up to 20% off list.

THE COMPUTER CENTER — 31 East 31st St., New York 10016; (212) 889-8130. 10-7 Mon.-Fri., 11-6 Sat., 10-8 Thur.

UPSTATE COMPUTER SHOP, Commercial Drive/Route 5A, RD 1, Box 17A, Whitesboro 13492. (315) 768-8151. Apple-Commodore-Altos-VIC 20. Software/Hardware.

UPSTATE COMPUTER SHOP, 1823 Western Avenue, Albany 12203; (518) 456-3019. Commodore/VIC 20 Specialists.

COMPUTER CONCEPTS, 509 Chestnut Street, Cedarhurst 11516. (516) 374-0255. Atari, Apple, and other. Hardware/Software, Peripherals, Magazines, Books.

ADVANCED COMPUTER SYSTEMS, 18 Market St., Potsdam, 13676. (315) 265-5620. Apple, Commodore, O.S.I. and Novell Data Systems.

CASTLE COMPUTERS, 720 New Loudon Rd., Latham, 12110. (518) 783-9405. M-F: 10-6, Sat: 12-5. Apple, Atari Hardware/Software.

COMPUTER WORLD — 4254 N. Buffalo Rd., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari Hardware/Software.

FUTURE VISIONS COMPUTER STORE, 70 Broad Hollow Rd., Rt. 110, Long Island, 11747. (516) 423-7820. Apple, Osborne, Northstar, Ithaca Intersystems.

VIDEO VILLAGE, LONG ISLAND, 5060 A Sunrise Highway, Massapequa Park, 11762. (516) 799-1616. Long Island's largest Atari dealer. Great Software/Service.

THE COMPUTER STORE, 221 East Post Rd., White Plains, 10601. (914) 428-1661. Apple, Zenith, Sanyo, Diablo, Epson.

THE COMPUTER STORE, 40 East 52nd St. N.Y.C. 10022. (212) 832-2180. Apple, Zenith, Sanyo, Diablo, Epson.

SOFTWARE CITY, PEARL RIVER — 147 Kinderkamack Rd., Montvale 07645. (201) 391-0931. Bus/Rec/Utility/Home programs for most microcomputers. Up to 20% off list.

AMHERST — HEATHKIT ELECTRONIC CENTER, 3476 Sheridan Drive., (716) 835-3090. Heath/Zenith Computers, Software, Peripherals.

JERICHO, L.I. — HEATHKIT ELECTRONIC CENTER, 15 Jericho Turnpike, (516) 334-8181. Heath/Zenith Computers, Software, Peripherals.

ROCHESTER — HEATHKIT ELECTRONIC CENTER, 937 Jefferson Rd., (716) 424-2560. Heath/Zenith Computers, Software, Peripherals.

N. WHITE PLAINS — HEATHKIT ELECTRONIC CENTER, 7 Reservoir Rd., (914) 761-7690. Heath/Zenith Computers, Software, Peripherals.

NORTH CAROLINA

GREENSBORO — HEATHKIT ELECTRONIC CENTER, 4620 W. Market Street, (919) 299-5390. Heath/Zenith Computers, Software, Peripherals.

OHIO

ABACUS II — 1417 Bernath Pkwy., Toledo 43615; (419) 865-1099. 10-6, 10-7 Thurs. Apple, Osborne, Adds, NEC, Atari, Epson & IDS Printers.

BARNHART STORES — Urbana; (513) 653-7257. 8am-5pm. Atari Computers at MAIL ORDER prices/Authorized Atari Service Center.

NORTH COAST COMPUTERS — 626 Dover Center, Bay Village 44140; (216) 835-4345. 10-6 Mon.-Sat., 10-8 Tue., Thur. Apple/Atari/Vector Graphic/Data General.

PENNSYLVANIA

CALDWELL COMPUTER CORP., 6720 Rising Sun Ave. Philadelphia 19111. (215) 742-8900. Apple, Commodore, Percom, Northstar Sales/Service.

COMPUTERLAND/HARRISBURG, 4644 Carlisle Pike, Mechanicsburg, 17055. (717) 763-1116. Apple, IBM, Xerox, Zenith. Sales, support and training.

ERIE COMPUTER CO., 2131 W. 8th St., Erie, 16505. (814) 454-7652. Apple, Commodore, OSI, Xerox, Atari, Osborne. Large Selection of Software.

MARKETLINE SYSTEMS INC., 2337 Philmont Avenue, Huntington Valley, 19006, (215) 947-6670. We sell and service MicroComputers and Peripherals for small business and industry.

STARGATE ENTERPRISES, 1111 Fifth Avenue, McKeesport, 15132, (412) 664-1111, hours: 10-6/Monday-Saturday. Authorized Atari dealer with Atari information Center.

STARGATE II, 168 Madison, Rochester, (412) 664-1111, authorized dealer of Atari, also selling Televideo, Quasar, Casio and Deck.

THE COMPUTER STORE, THE Philadelphia Center Hotel, Philadelphia, PA. 19103. (215) 567-6475. Apple, Zenith, Sanyo, Diablo, Epson.

20/20 COMPUTER, 2020 Hamilton Street, Allentown, 18104, (215) 439-1800. Atari, Apple, Durango, Hewlett Packard, Data General, Zenith, Televideo. Hardware/Software and Peripherals.

NEWSY-AT THE CHATHAM, 139 South Twentieth Street, Philadelphia, 19103 - (215) 563-1219, Domestic/Foreign periodicals including wide range of computer publications.

PHILADELPHIA — HEATHKIT ELECTRONIC CENTER, 6318 Roosevelt Blvd. (215) 288-0180. Heath/Zenith Computers, Software, Peripherals.

FRAZER — HEATHKIT ELECTRONIC CENTER, 630 Lancaster Pike, (Rt. 30) (215) 647-5555. Heath/Zenith Computers, Software, Peripherals.

PITTSBURGH — HEATHKIT ELECTRONIC CENTER, 3482 Wm. Penn. Hwy. (412) 824-3564. Heath/Zenith Computers, Software, Peripherals.

OKLAHOMA

OKLAHOMA CITY — HEATHKIT ELECTRONIC CENTER, 2727 Northwest Expressway. (405) 848-7593. Heath/Zenith Computers, Software, Peripherals.

RHODE ISLAND

THE COMPUTER STORE, 740 North Main, Providence 02904. (401) 331-0220. Apple, Zenith, Sanyo, Diablo, Epson.

WARWICK — HEATHKIT ELECTRONIC CENTER, 558 Greenwich Ave. (401) 738-5150. Heath/Zenith Computers, Software, Peripherals.

UTAH

MIDVALE — HEATHKIT ELECTRONIC CENTER, 58 East 7200 South. (801) 566-4626. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA

COMPUTERS, ETC. . . 6671 Backlick Rd.,, Springfield, 22150. (703) 644-5500. Apple, Cromemco, Osborne, Northstar, Seequa. Sales/Service/Training.

THE COMPUTER STORE, 6858 Old Dominion Drive, McLean, 22101. (703) 821-8333. Apple, Zenith, Sanyo, Diablo, Epson.

ALEXANDRIA — HEATHKIT ELECTRONIC CENTER, 6201 Richmond Hwy., (703) 765-5515. Heath/Zenith Computers, Software, Peripherals.

VIRGINIA BEACH — HEATHKIT ELECTRONIC CENTER, 1055 Independence Blvd. (804) 460-0997. Heath/Zenith Computers, Software, Peripherals.

WASHINGTON, DC

STARWARE*, Suite 551, 1629 K Straet Northwest 20006; (202) 337-5300; everything for the IBM/Software, Hard Discs, Color Printers, Modems, etc. . .

THE COMPUTER STORE, 1990 K Street N.W., Washington D.C. 20006. (202) 466-3367. Apple, Zenith, Sanyo, Diablo, Epson.

WASHINGTON

SEATTLE — HEATHKIT ELECTRONIC CENTER, 505 8th Ave., N. (206) 682-2172. Heath/Zenith Computers, Software, Peripherals.

TUKWILA — HEATHKIT ELECTRONIC CENTER, 15439 53rd Ave., S. (206) 246-5358. Heath/Zenith Computers, Software, Peripherals.

VANCOUVER — HEATHKIT ELECTRONIC CENTER, 516 S.E. Chaklov Dr., (206) 254-4441. Heath/Zenith Computers, Software, Peripherals.

CREATIVE COMPUTING Readers will respond to your store's listing in the RETAIL ROSTER. Let them know what brands of computer-oriented products you sell; what services you offer. Rates are reasonable . . . success is lasting! Call number listed above for complete information and assistance.

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

Please Direct Inquiries to: Jim Beloff; (212) 725-4216.

Sinclair ZX81

Software on cassette.

MULTIFILE Data Storage System. A versatile multi-purpose filing system for 16K ZX81. Menu-driven. The number, size and heading of files are user-definable. Files may be created, modified, replaced, and searched, and are protected by a security lock. Output to ZX printer is provided. MULTIFILE is supplied on cassette with three blank cassettes for data storage, and packed in an attractive permanent storage case. Supplied with extensive documentation describing applications for both business and personal use. **$29.95**

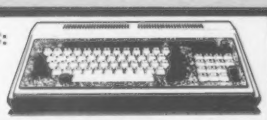
ZXAS Machine Code Assembler (16K) **$9.95**
ZXDB Machine Code Disassembler/Debugger (16K) **$9.95**
ZX CHESS! Your choice of 7 levels of play, white or black, set up any position to be analyzed, change levels of play during a game, swap sides, and more. (16K) **$24.95**
INVADERS! Ten levels of play! (16K) **$9.95**
STARTREK Trek across the galaxy. (16K) **$9.95**
ADVENTURE: Damsel and the Beast! (16K) **$14.95**
1K PROGRAM PACK. 8 compact, entertaining programs. **$9.95**
16K PROGRAM PACK. Four entertaining programs **$9.95**
10 EXCITING ZX81 PROGRAMS **$14.95**

Books
30 Programs for the ZX81 (1K) **$14.95**
Understanding Your ZX81 ROM **$19.95**
ZX81 ROM Disassembly Part A **$14.95**
Full replacement warranty all tapes.
Write for our FREE SOFTWARE CATALOGUE for ZX81

GLADSTONE

Gladstone Electronics 901 Fuhrmann Blvd. Buffalo NY14203
Telephone Orders (716) 849-0735 VISA/MC. No C.O.D.'s please
Mail Orders: Send check, money order, Visa or MC number. $1.50 per order handling.

NEC:



COMMODORE VIC
$CALL

APPLE, ALTOS, HP & XEROX
RCA VP-3501 Videotex
Data Terminal ..... CALL $

Terminals
Adds, Hazeltine, Televideo
Calculators
H.P. & Sharp
Video Recorders
Mitsubishi (MGA), RCA & Sony
Scotch
Data Diskettes & VCR Tapes

Mail Order: FUTRA COMPANY
P.O. Box 4380-CC, Torrance, CA 90510
(213) 328-8951 (800) 421-5006
Retail: OMC
20695 S. Western Ave #124,
Torrance, CA 90501
TWX 910 349-6211 AGENFTRA TRNC

DISKETTES CASSETTES

Error-Free 5¼-inch Diskettes (MD-5) single-sided, soft sector, single or double density, reinforced hub.

Item	Qty 10	Qty 50
MD-5	$25.00	$110.00
C-10	$ 7.50	$ 32.50
C-20	9.00	39.00
C-60	11.50	50.00
C-90	15.00	70.00

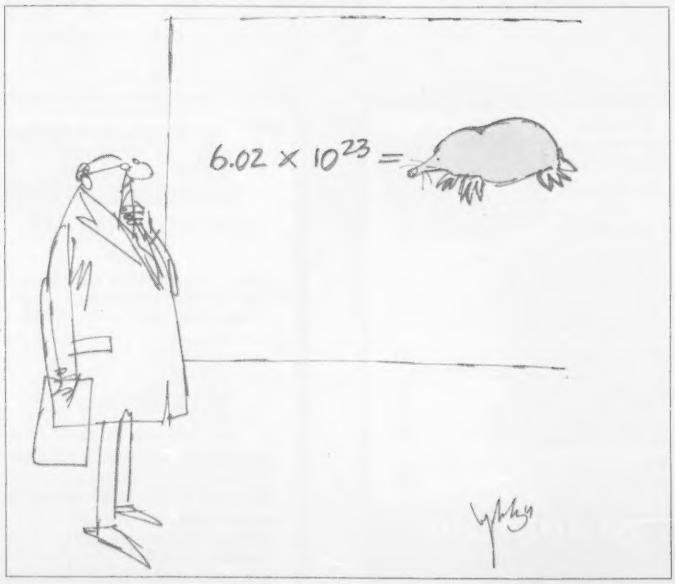
UPS SHIPPING INCLUDED
in Continental USA
CA Customers add taxes

MICROSETTE
475 Ellis St., Mt. View,
CA 94043 (415) 968-1604

• index to advertisers •

Reader Service	Advertiser	Page
101	Aardvark Technical Services	131
102	ABM Products	203
103	Accent Software	36
*	Alf Products	21
104	Alpha Byte Stores	84-85
105	Alpha Byte Stores	119
106	Amdek Corporation	87
107	Apparat	74
199	Archive	45
*	Artworx	187
108	ASAP Computer Products Inc.	211
*	Aspen Software	20
109	Atari	24-25
110	Automated Simulations	57
111	Beagle Brothers Micro Software	219
164	Big Five Software	2
113	BBI Mail Order	118
114	Broderbund Software	36
115	Budgeco	169
116.	Business & Professional Software	34
117	Bytes & Pieces	221
118	Calsoft	191
119	Chrislin Data	199
*	Classified	237
120, 259	CLOAD Magazine	30
121	Commodore Business Machines	cover 3
122	Comm Data Systems	229
123	Compuserve	38
124	The Computer Book Club	213
125	Computer Discount of America	161
126	Computer Exchange	167
127	Computer House	229
128	Computer Mail Order	124-125
*	Computer Mart	239
129	Computer Plus	118
130	Computer Service Corp.	5
131	Computer Shopper	221
133	Computer Station	229
134	Computer Time Inc.	236
*	Computer's Voice	221
135	Computer's Voice	121
136	Computronics	141
137	Computronics	143
138	Conceptual Instruments	26
139	Consumer Computers Mail Order	227
140	Corona Data	9
141	Cortechs Corporation	29
142	Cosmic Corp Unlimited	215
143	Cottage Software	121
144	CPU Shop	201
145	C.R.C. Publishing	232
146	Creative Discount Software	103
*	Creative Software	99
147	Cybercom	53
148	B. Dalton	159
150	Dickens Data	38
151	Discount Data Products	69
152	Discount Software Group	223
153	Dresselhaus Computer Products	90
154	Dynacomp	107-109
155	800 Software	173
156	Electronic Specialists	215
157	Federal Energy Systems	225
158	Financial Software	207
159	Franklin Computing	48-49
160	Frederick Computer Products	169
161	Happy Hands	121
*	Heath Co.	65
162	H & H Trading	232
163	Howard Software Service	123
112	Huntington Computing	171
165	IMB	237
*	Infocom	13
166	Inmac	233
167	Insoft Corp.	93
168	Jade Computer	133-135
169	Kelly's Computing	75
170	Kern	11
171	Krell Software	117
172	Leading Edge	cover 4
174	LNW Research	151
173	LNW Research	17
175	Logo Computer Systems	79
176	Memotech	111
177	Memory Mill	16
178	Micro Business World	115
179	Microcomputer Technology Inc.	153
180	Micro D	10
181	Micro Data Tek	234
182	Micro Lab	55
183	Micro Lab	96
184	Micro Lab	72-73
185	Micro Management	173
186	Micro Mountain	91
187	Micro Post	127
188	Microstand	233
190	Microware Distributing	235
191	Microworks	131
192	Mind Systems	60
193	Muse Software	90
194	Muse Software	121
195	Neeco	147
196	Okidata	139
197	Olympia	205
198	Omega Microware	155
200	On-Line Systems	23
201	On-Line Systems	95
202	Optimized Systems Software	161
203	Orange Micro	61
204	Pacific Exchanges	118
204	Pacific Exchanges	121
204	Pacific Exchanges	121
204	Pacific Exchanges	221
204	Pacific Exchanges	222
209	Pan American Electronics	165
210	Peek & Poke Software	117
211	Peelings II	101
212	Perry Oil & Gas	194
213	Philadelphia Computer Discount	163
214	Phoenix Software Inc	151
215	Piccadilly Software Inc.	71
216	Practical Peripherals Inc	cover 2-1
217	Professional Software	105
218	Professional Software	129
219	Programmers Institute	220
220	Programs Unlimited	231
221	Prometheus Products Inc	50
260	Protecto Enterprizes	237
222	Quality Software	236
223	Quark Engineering	58
224	Que Corporation	230
225	Radio Shack	42
226	Realty Software	222
*	Retail Roster	238-239
227	R.H. Electronics	194
228	River Bank Software	103
229	Rock Roy Inc.	47
230	Royal Software	203
231	Sheridan College	89
232	Silicon Valley Systems	89
233	Simply Software	165
*	Sinclair Research Ltd	31-33
235	Sirius Software	39-41
236	Sirius Software	227
237	Sir-Tech	63
238	Smith Corona	209
239	Softtape	157
240	Software Street	189
241	Sorrento Valley	217
242	Southern Case	117
243	Spectral Associates	219
244	Starware	237
245	Strategic Simulations	82
246	Strictly Software	113
247	Strobe	18
248	Sublogic	173
249	Symtech	225
250	Synapse Software	66
251	Synapse Software	103
252	Tecmar Inc	7
253	Trans Net Corporation	236
254	Valpar	15
255	VR Data	197
256	W E Software	101
257	Western Micro	89
258	Wims	22

*Write Advertiser Directly

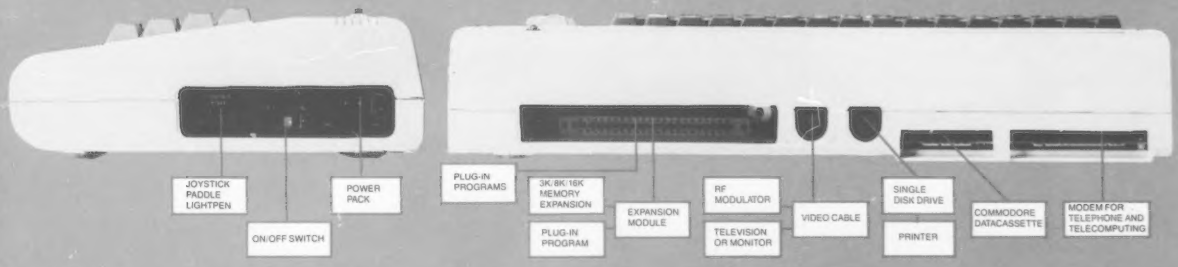


COMMODORE VIC-20®

"THE WONDER COMPUTER OF THE 1980s. UNDER $300."

—WILLIAM SHATNER

"The best computer value in the world today. The only computer you'll need for years to come."



VIC-20® VS. OTHER HOME COMPUTERS

Product Features	Commodore VIC-20	Atari* 400™	TI® * 99/4A	TRS-80® Color Computer
Price*	$299.95	$399.00	$454.00	$399.00
Maximum RAM Memory	32K	16K	48K	32K
Keyboard Style	Full-Size Typewriter Style	Flat Plastic Membrane	Full-Size Typewriter Style	Calculator Style
Number of Keys	66	57	48	53
Programmable Function Keys	4	0	0	0
Graphic Symbols On Keyboard	62	0	0	0
Displayable Characters	512	256	192	256
Microprocessor	6502	6502	TMS9900	6809
Accessible Machine Language	YES	YES	YES	YES
Upper/Lower Case Characters	YES	YES	YES	NO
Operates with all Peripherals (Disk, Printer and Modem)	YES	NO	YES	YES
Full Screen Editor	YES	YES	YES	NO
Microsoft Basic	Standard	N/A	N/A	$ 99.00
Telephone Modem	$109.95	$399.95	$450.00	$154.95

*Manufacturer's suggested retail price March 1, 1982. Includes BASIC cartridge required for programming.

Read the chart and see why COMPUTE! Magazine[1] calls the VIC-20 computer "an astounding machine for the price." Why BYTE[2] raves: "...the VIC-20 computer unit is unexcelled as a low-cost consumer computer." Why Popular Mechanics[3] says "...for the price of around $300, it's the only game in town that is more than just a game." And why ON COMPUTING INC.[4] exclaims: "What is inside is an electronic marvel... if it sounds as if I'm in love with my new possession, I am."

The wonder computer of the 1980s. The VIC-20 from Commodore, world's leading manufacturer of a full range of desktop computers. See the VIC-20 at your local Commodore dealer and selected stores.

1 April '81 issue 2 May '81 issue 3 November '81 issue 4 Fall '81 issue

VIC-20

commodore COMPUTER

Commodore Computer Systems
681 Moore Rd., King of Prussia, PA 19406
Canadian Residents: Commodore Computer Systems
3370 Pharmacy Ave., Agincourt, Ont., Canada, M1W 2K4

Please send me more information on the VIC-20.

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ CC-7

CIRCLE 121 ON READER SERVICE CARD

REMEMBER:

MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

CIRCLE 172 ON READER SERVICE CARD